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REPORT RESUMES

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AN EXPLORATORY INVESTIGATION INTO THE MEASUREMENT OF CURIOSITY IN ELEMENTARY SCHOOL CHILDREN.
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DESCRIPTORS- *CURIOSITY, *TESTING, *MEASUREMENT INSTRUMENTS, INDIVIDUAL CHARACTERISTICS, *PERSONALITY, GROUP BEHAVIOR, *ELEMENTARY SCHOOL STUDENTS, GRADE 5, BRYN MAWR, PENNSYLVANIA, NEWARK, DELAWARE, NEW CASTLE COUNTY, DELAWARE

THE POSSIBILITY OF DEVELOPING A NUMBER OF PAPER AND PENCIL TEST INSTRUMENTS AND TECHNIQUES WAS EXPLORED FOR YIELDING RELIABLE MEASURES OF CURIOSITY AMONG ELEMENTARY SCHOOL CHILDREN. INVESTIGATIONS WERE CONDUCTED IN APPROXIMATELY 40 FIFTH-GRADE CLASSROOMS AND CARRIED OUT IN 2 PHASES--A PREPARATION PHASE AND A TESTING PHASE. IT WAS FIRST NECESSARY TO IDENTIFY GROUPS OF CHILDREN POSSESSING DIFFERENT AMOUNTS OF CURIOSITY, AND TO DO THIS, CURIOSITY ITSELF, AS IT PERTAINED TO SCHOOL CHILDREN, HAD TO BE DEFINED. A MAJOR STUDY TESTED A FINAL BATTERY OF 11 ITEMS DESCRIBED AS FOLLOWS--(1) PICTURE-AND-STORY-SATISFACTION, (2) PREFERRED-BEHAVIOR, (3) HIDDEN-PICTURE, (4) BREADTH-OF-INFORMATION, (5) MEMORY-FOR INCOMPLETE-STORY, (6) PREFERENCE-FOR-THE-UNBALANCED-AND/OR-UNFAMILIAR, (7) WHICH-SAYING-DO-YOU-BELIEVE, (8) RIDDLE-PATH-PUZZLE, (9) CODE-TEST, (10) FOOLISH-SAYINGS-TEST, AND (11) MAZE-TEST. THESE ITEMS WERE THEN TESTED FOR RELIABILITY IN MEASURING CURIOSITY. NO SINGLE ITEM OR ANY COMBINATION THEREOF WAS SUCCESSFUL IN IDENTIFYING WITH A HIGH DEGREE OF ACCURACY CURIOSITY IN ANY GIVEN CHILD. WITH RESPECT TO THE SELECTION OF GROUPS OF CHILDREN WITH HIGH CURIOSITY, HOWEVER, THE TESTS WERE MUCH MORE SUCCESSFUL, PARTICULARLY THOSE WHICH PROVIDED DISTURBANCES AND NOVELTY FACTORS AND WHICH MEASURED BREADTH-OF-KNOWLEDGE AND PERSISTENCE. PERHAPS THE GREATEST CONTRIBUTION OF THIS PROJECT WAS THAT IT PROVIDED DATA FOR STIMULATING A NUMBER OF BROADER STUDIES IN THIS FIELD. THESE POTENTIAL PROGRAMS WERE OUTLINED IN THE REPORT. (JH)

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An Exploratory Study
into
The Measurement of Curiosity in Elementary School Children

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Project No. 801
(SAE 8519)
1964

The research reported herein was performed pursuant to a contract with the United States Office of Education, Department of Health, Education, and Welfare.

——— "That is, some books are to be read only in parts; others to be read but not curiously; and some few to be read wholly, and with diligence and attention."

——— Francis Bacon.

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While many have played a significant role in this research, the authors, themselves, recognize the limitations both of the study and of the report. The responsibility for such shortcomings is theirs alone.

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Chapter I

Purposes and Procedures

Casual observation indicates that most, if not all, children when they are young are aroused to curiosity by their environments. For reasons yet unknown, many children seem to lose their curiosity as they grow older. It also appears that improvements in our culture are brought about by people who have maintained and developed their curiosity.

Although such ideas as these about curiosity have been discussed for many years, few attempts have been made to study curiosity in school children. Therefore, it was the purpose of this study to explore the possibilities of developing paper-and-pencil instruments to measure curiosity in elementary school children. More specifically, the research was conducted in an effort to answer the following questions:

1. Can curiosity be measured with paper-and-pencil instruments?
2. Can curiosity be measured by using test situations that disturb the child sufficiently to cause him to explore further in order to restore his equilibrium?
3. Can curiosity be measured by using test items which introduce novelty into familiar settings?
4. Can curiosity be measured by using test items similar to those used for measuring breadth of knowledge?
5. Can curiosity be measured by using test items that indicate persistence?
6. Can curiosity be measured by using test items that indicate the child's attitude toward curiosity?
7. Can curiosity be measured adequately by using a single type of test item?

Defining Curiosity

Since the word curiosity does not have the same connotation for everyone, it is necessary to define the term more precisely for this study. In order to arrive at a workable definition, several approaches were used. These are described in detail in Chapter III. They included informal inquiries, formal inquiries, review of dictionary definitions, an examination of the historical development of the word, and a survey of ancient and modern literature.

After examining all the information available, it was concluded that curiosity is demonstrated by an elementary school child when he:

1. reacts positively to new, strange, incongruous, or mysterious elements in his environment by moving toward them, by exploring them, or by manipulating them.
2. exhibits a need or a desire to know more about himself and/or his environment.
3. scans his surroundings seeking new experiences.
4. persists in examining and exploring stimuli in order to know more about them.

Importance of Studying Curiosity in Elementary School Children

The need for the study is indicated, on the one hand, by statements claiming that this attribute is important in creativity, problem solving, and some types of learning, and on the other hand, by the dearth of studies on this topic dealing with school children. In the scholarly and comprehensive bibliography of more than 450 items in Berlyne's Conflict, Arousal, and Curiosity (10), there is not a single reference to classroom behavior. In fact, with the exception of the works of Piaget, one reference dated 1930, and three articles reporting on the vision of infants, children are not mentioned specifically in the bibliography.

Yet, if curiosity is to be maintained and even increased it must be done with school-age children. To do anything about curiosity means that ways must be found to distinguish children who have much curiosity from children who have little curiosity. Such groups must be identified before the variables differentiating the two groups can be studied.

It is not unreasonable to believe that knowledge of such variables will lead to better understanding of the proper conditions for the maintenance and encouragement of curiosity. Some of these conditions may be under the control of the elementary school teacher. However, in order to discover materials or procedures that will be effective in improving curiosity in the classroom, it is important that techniques or instruments for measuring curiosity be developed. Without such instruments and/or techniques, it will be difficult to work directly with the attribute in the classroom.

In research in curiosity, ways of identifying a large number of children at one time would be very helpful. Therefore, it was planned to design only paper-and-pencil instruments. These were to be both verbal and nonverbal.

Limitations of the Study

The investigation was conducted in 38 fifth-grade classrooms in New Castle County, Delaware. The fifth grade was selected to avoid, as far as possible, children with developmental reading problems and children whose interests were as crystallized as is often the case of junior and senior high school pupils.

Since the study was limited to the fifth grade, age and grade were controlled. However, since this was the case, no comparisons among age groups or grade groups was possible or intended.

New Castle County is a suburban area outside the City of Wilmington. There are some farms, but agriculture is limited. Large industries, especially chemical, employ the majority of the people. Many of them are working in research and development. For the most part, they have come to Delaware from other areas of the United States. No urban children participated in the present study.

The State of Delaware provides special classes for the educable and trainable. Therefore, there were no children in the study with IQ's low enough to be admitted to the special classes. The means of the IQ's of the children used in the two preliminary studies were above average, clustering around 103. The means of the IQ's of the children participating in the major study were considerably higher, clustering around 115.

The children in the two preliminary studies were selected from fifth grades in the New Castle Special School District, New Castle, Delaware. Thirteen classes participated. Six classes cooperated in the first preliminary study, conducted in the spring of 1960; seven in the fall of 1960. The following four school districts cooperated in the study during the spring of 1961: Newark Special School District, Newark, Delaware; Alfred I. duPont School District, Wilmington, Delaware; Stanton School District, Stanton, Delaware; Mount Pleasant Special School District, Wilmington, Delaware.

All of the instruments were administered by either the director or the co-director of the study. In order to determine what changes might be necessary in the administration of the tests, the co-director did not administer tests during the two preliminary studies. Instead, the co-director observed the director in order to determine the necessary changes. At the same time, the children were observed to see what effect the administration of the tests had on them. In this way, disturbing aspects of certain tests were eliminated.

Although both preliminary studies and the major study were conducted within ten-week periods, there were some cases lost in each study. The majority of the children who did not complete all of the tests were children who had moved out of the school districts during the time that the tests were being administered. In some cases, children were absent when particular tests were given. Attempts were made to make up the missing tests, but there were some children who could not be reached.

The Plan of the Research

The research was carried out in two major phases -- namely, the preparation phase and the testing phase. The testing was conducted in two preliminary studies and in a larger major study.

During the preparation phase, instruments were developed which logically seemed to measure curiosity. These were single-type-item tests. Other instruments were developed that were to be used to determine criterion groups.

During the first preliminary study, both the validation instruments and the tests were administered. Those instruments which did not seem worthwhile were discontinued. The other tests were analyzed and, where it was deemed desirable, they were modified. New types of items were also developed.

During the second preliminary study, the revised items and the newly constructed items were tried out. Again, the items were studied for difficulty and discrimination. Those items which significantly discriminated between children high in curiosity and children low in curiosity were retained.

These items were cast into two batteries. The batteries were administered to the twenty-five classes constituting the major study, The batteries were re-administered to the same children two weeks later in order to obtain estimates of reliability by the test-retest method.

Plan of the Report

This report consists of three parts -- a review of the literature, a description of the establishment of criterion groups, and a description of the development and evaluation of the instruments used to measure curiosity. The review of the literature, in Chapter II, includes statements of opinion, descriptions of theory, and reports of research conducted with both subhuman species and human beings. Chapter III is devoted to describing the identification of criterion groups. The instruments used for this purpose, together with their strengths and limitations, are examined. In Chapter IV, the development, the reliability, and the effectiveness of the instruments used to measure curiosity are described. The differences between curiosity groups and between the sexes are reported for each measuring device. The items used in each phase of the investigation are included in the Appendices. The results are summarized in a concluding chapter in terms of the three studies.

Chapter II

Review of the Literature

The nature of curiosity was a subject of interest long before the onset of the Christian era. In some periods and in some civilizations, the characteristic has not been highly acceptable. Ecclesiasticus warned the Hebrews not to be too curious (35). In other times, the very survival of the culture seems to depend upon the level of intellectual curiosity of members of the society. The present time is an example of the latter.

The literature pertaining to curiosity can be divided according to two broad and somewhat overlapping rubrics. Most of the material is theoretical; some of it is based on empirical studies. Unfortunately, too many of the so-called theoretical statements are, in fact, little more than opinion. However, the separation of opinion from theory is not attempted here. These opinions or theories do give a clue to the thinking of persons who at some time or other have been concerned with curiosity. The empirical studies, for the most part, are based upon research conducted in a laboratory with animals. Very few studies have been conducted with human beings.

Theoretical Statements or Opinions Regarding Curiosity

Most of the writings in the area of curiosity are attempts to answer the following three questions:

1. What is the nature of curiosity?
2. How is curiosity stimulated or depressed?
3. What are the values, if any, of curiosity for society?

Nature of curiosity. -- In 1911, Monroe (74) pointed out that some writers considered curiosity to be an instinct. In some animals there seems to be a natural disposition to examine every object that impresses itself on the sense receptors. Muller (32) has proposed that without a high level of sensitivity, or curiosity, the species could not have survived. That the human race has endured is in, and of, itself an indication that curiosity is possessed by the group and is transmitted to the offspring of members of the group. Certainly, the higher receptive ability coupled with more varied possibilities for responding possessed by animals high on the evolutionary scale makes the arousal of natural sensory curiosity more significant among them.

Monroe (74), while accepting, in part, the instinctive nature of curiosity, also accepted "acquired curiosity." He stated that

> acquired curiosity follows in the train of acquired experience, for as soon as experience in any given line has accumulated, there is a disposition on the part of the individual to increase his information about objects with which he has contact.

Monroe's explanation of the nature of curiosity provides for both instinctive and acquired curiosity and incorporates both attention and interest.

The Freudian interpretation, for the most part, is that curiosity is a result of the blocking of natural drives. According to the psychoanalytic school (18), curiosity is a drive to know growing out of several drives of the libido. It appears to be a sublimated form of acquisition coupled with energy which stems from the looking impulse. Because of the process of sublimation, the past experience which sets off exploratory behavior may not seem to bear resemblance to the present stimuli. It is almost impossible for the observer to know whether curiosity at any given time is due to earlier experiences that are anal-aggressive, anal-retentive, oral-incorporative, oral-sadistic, or scoptophilic. In any case, present behavior appears to be set off by memory traces of past experiences no matter how foreign the traces may appear to the reality of the observer. Nunberg (86) has tried to illustrate the Freudian position in a recently published case report. In this study, the patient's current insatiable curiosity stemmed from earlier attempts to satisfy basic sexual needs. Nunberg groups some of these primal needs under the rubric "need for causality."

To Nunberg, as well as to some other Freudians, uncontrolled curiosity can be exceedingly dangerous. Nunberg closes his case report with these words:

> Curiosity and the need for causality are boundless. There are individuals whose urge to know is unlimited and whose ego seems to lose control over this urge and to become its prisoner. Individuals of this type may be utterly ruthless in their avidity for knowledge and totally unconcerned with the possible consequences of their search. They may not even be deterred by the prospect of comprehensive destruction, including their own, when they hope to come closer to their goal. One gets the impression that the pure instinct of destruction has been released in them. Indeed, Freud says that with sublimation there occurs not only desexualization but at the same time a defusion of the two groups of instincts which sets destructive instincts free. Since infantile sexual curiosity as such contains an aggressive element, we might say that the explorer, in a sense, returns to the level of the child who ruthlessly tries to satisfy his curiosity.

> Curiosity may, on the one hand, be a blessing and stimulate intellectual performances of highest value; on the other hand, it may lead to destruction if too much aggression is released. We may, perhaps, take comfort from the observation that nature often enhances the creative and constructive forces when excessive destructive power has been freed.

Earlier Shoenfeld (100) had claimed that curiosity is often a symptom of neurotic and destructive behavior. According to him, this is often shown in the way a child responds to the answers given to his questions, especially when he asks a question repeatedly without ever seeming satisfied with the answer or if he seems preoccupied with the answer to the exclusion of other interests. To Shoenfeld, the infant's first curiosity is about sex. This, according to Josselyn (53) should begin to be satisfied and sublimated to curiosity about the external environment during the phallic period.

Another Freudian approach to curiosity is seen in the work of Emch (36) on the effects of the Unknown on adjustment. Whether one desires to move into the Unknown or not is contingent upon knowing something about this Unknown. What is known, however, may be held at the subconscious as well as the conscious level and may appear to be quite divergent from reality. Yet something must be known about the Unknown or one cannot evaluate any step toward or away from it. Emch's study of people who wanted to know everything about everybody and those who did not want to know anything about anyone would be meaningless if his patients had not had contact with other human beings prior to the investigation. It can be assumed from this that he considers curiosity to be a perceptual function operating somewhere between partial knowledge of a stimulus and the satisfactory satiation of any arousal occurring as a result of stimulation.

Tuttle (118) claims that curiosity is at the basis of all systematic study and feels it can be accounted for on the basis of some "innate capacity for emotional satisfaction in intellectual groping." He equates the motive of early Greek philosophy, or "love of truth," with the urge of curiosity.

If one observes children between four and ten, a searching for truth is noted. Hasbrouck (49) considers this to be the period when children are most curious. Some question, however, whether all searching for truth may be labelled curiosity. Simon Flexner was quoted in a Saturday Evening Post editorial (29) that it is curiosity only when one seeks "knowledge for knowledge's sake alone without reference to utility." Olds (87) stated this difference more succinctly when he said,"Motivation is provided by curiosity when something is not explained and by goals when an object system is engaged."

In attempting to set forth a theory of human motivation, Maslow (62) answers the riddle of curiosity by postulating a basic desire to know which is prepotent over the desire to understand. He claims that:

> If we remember that the cognitive capacities (perceptual, intellectual, learning) are a set of adjunctive tools which have, among other functions, that of satisfaction of our basic needs, then it is clear that any danger to them, any deprivation or blocking of their free use, must also be directly threatening to the basic needs themselves. Such a statement is a partial solution of the general problems of curiosity, the search for knowledge, truth and wisdom, and the ever-persistent urge to solve the cosmic mysteries.

The nature-nurture conflict regarding curiosity is not clarified by referring to other psychological theorists. McDougall (70) includes curiosity as one of the principal instincts of man. He relates it to the emotion of wonder. Gardner (40) in 1957, writing in the National Education Association Journal, repeated approximately the same relationship when he said:

> Wonder, in children, as opposed to curiosity, connotes no sense of purpose. It is rather related to contemplation. It is moral as well as esthetic and intellectual. It is a sense of man's kinship with the universe. It is wonder which makes mere curiosity or interest meaningful and saves it from the flaws of egotism and selfishness.

Pavlov (92) takes a position with the instinctivists. He speaks of an "investigatory reflex." Woodworth (128) elaborated on this idea when he said: "The present thesis is that perception is always driven by a direct inherent motive which might be called the will to perceive."

While some writers stress curiosity as reflecting the primary tendency of all tissues and organs toward "functional expression," others look upon curiosity as a secondary tendency arising from primary drives. Tolman (114) classifies curiosity with such second-order drives as gregariousness and self-assertion.

Dember and Earl (32) classify curiosity with exploratory behavior and manipulation as a form of attention. Leuba (58) points out that there is a tendency for these forms of behavior to be grouped together as far down the evolutionary scale as the rats. He looks on the most significant aspect of curiosity, however, as that which is derived from training. Morse and Wingo (79) also emphasize the value of coupling training to native curiosity. They state that teaching is blending the child's native curiosity and the school program to the fullest extent of the child's individual capacity.

Nowhere in the literature is there a precise statement as to the nature of curiosity. Perhaps the most definitive attempt to develop a theory of curiosity is found in the work of Berlyne (7). He struggles with the problems of primary vs. secondary drives and native vs. acquired curiosity. He proposes a two-fold scheme. He would place scanning and "random" exploring behavior under the rubric "perceptual curiosity." He would classify secondary level, or learned, curiosity under the label "epistemic curiosity." Berlyne, however, admits that it is extremely difficult to keep these classifications as clear-cut as might be desired. In 1958, Sartain _et al_ (98) summarized what is known about the nature of curiosity when they wrote:

> Recent research has established an independent exploratory drive. The least we can say (and maybe the most) is that the exploratory drive is definitely a distinct drive, although like others, a drive modifiable and modified by learning.

The stimulation or depression of curiosity. -- Although there seems to be some haziness as to the exact nature of curiosity, there are also many who consider it a valuable attribute and who are interested in its development. In 1929, Ashbaugh (1) claimed that curiosity is "of 'primal importance' in learning and every other phase of life and should be encouraged." He went on to say that it is during the pre-school years that natural curiosity is given full play by the adults in the environment who attempt to answer the child's questions. However, according to Ashbaugh, when the child goes to school he is often discouraged from asking questions or challenging teachers.

Ashbaugh's statements barely touched the topic as to what to do to promote curiosity. Three years later, Oswald (90) in setting forth the obstacles to the development of intellectual curiosity listed several points which might be considered as the groundwork for building programs to improve curiosity. He listed the following obstacles:

1. Teachers who do not realize the importance of developing intellectual curiosity.

2. Teachers who make no attempt to inspire pupils.

3. A society that demands too much conformity.

4. Children with low IQ.

5. Schools where classes are too large.

6. Subject matter which is not taken long enough to arouse curiosity.

7. Elective systems which permit the student to spread himself too thin.

8. College boards when they are used as sole criterion of achievement.

9. Grading systems where a teacher is considered "good" if he gives high grades.

10. Promotion systems where pupils must become acquainted with a new teacher each year.

11. Time schedules which do not permit creativity and which make pupils clock watchers.

12. Textbooks that are too complete and that do not permit outside research.

13. Libraries that are inadequate for research.

Oswald claimed that teachers emphasize knowledge per se instead of curiosity because the former is easier to measure. He would like research that would make it possible to test a child's curiosity in a more objective manner than was possible in 1932.

One of the principal methods suggested to improve curiosity has been to help a child obtain a more realistic view of his environment. Mrs. Franklin Roosevelt in an article that appeared in the August 24, 1935 issue of Saturday Evening Post was aware of the relationship of curiosity to the attainment of a view of reality (97). Sherwood (99) said parents and teachers limited the child's opportunity to clarify his surroundings when they gave impatient and evasive answers to the child's questions. The value of the question as a means of attaining a better perception of reality is described by Olnick (88). He stated that the questioner asks a question to master and shape reality in a situation wherein passivity and anxiety threaten. The effective questioner knows the answer he wants. He may wish by the use of the question to negate reality. There appears to be a positive relationship between a well-developed ego and the use of questions to build a realistic world.

In helping a child find answers to his questions two extremes must be avoided according to Derieux (33). On the one hand, one must avoid the squelching of zeal through irritation, while on the other avoiding dogmatic answers. The latter gives the child no opportunity to explore the subject further. Derieux reminds his readers that children have "no background facts or experience to relate new [illegible] to and no comprehension of the terminology which would make an explanation possible."

Many writers stress the value of permitting the child to ask questions as a means of developing curiosity. According to Benjamin (4), when school programs are rigid and conformity to society is too strict, questioning is squelched. Courtis (28) feels that questions about the child's natural environment should be answered before any other questions. He goes on to say that these answers should be "self-obtained" as far as possible with adults giving friendly, helpful guidance in the search.

By helping a child find his own answers the adult will not only help him develop his intellectual curiosity, but also will lessen the number of questions asked only to obtain attention. Beyer (16) points out that information-seeking and relationship-understanding questions should be encouraged.

Witty (126) believes that answers to questions about external things and happenings and about causes and reasons depend upon helping children first develop adequate language in order to understand the answer. He feels that answers about mysterious natural or supernatural forces should be answered frankly but care should be taken not to be too dogmatic. Woodcock (127) said approximately the same thing by writing that one should not talk down to children, but should also be careful not to overestimate their ability by giving explanations which cannot be related to their own past experiences.

A few writers have gone beyond the nature of the questions themselves and asked what other characteristics should be present if helpful questions are to be asked. Punke (95) lists physical energy, habits, previous knowledge, confidence, and chance as the principal influences on curiosity. Leuba (58) stated that:

> Mature, older human beings tend to be governed by their habits. If they are curious and creative, it is mainly because they have become accustomed to those forms of behavior during the numerous earlier formative years and have learned to be persistent about them. In that process of habit formation, opportunities and encouragement play a significant role. It makes a big difference whether or not there is much to be explored in the environment and much that lends itself to transformation by way of carpentry, mechanical manipulation, painting, and so on. It makes a big difference, too, whether there is, on the one hand, dissatisfaction with things as they are and, on the other hand, encouragement, appreciation, praise, recognition, and other extraneous incentives rewarding curiosity and creativity. ...It is obvious that the eventual course of creativity is greatly influenced like that of curiosity, by the incentives and motives current in a culture.

Tuttle (118) emphasized the cultural nature of curiosity by pointing out that what nations or other large groups of people become depends in part upon how much freedom to be curious there is within them. The motive of early Greek philosophy, according to Tuttle, is to be found in the urge of curiosity. At the same time, the religious genius of the Hebrews determined the direction of their curiosity.

Much of the literature has been concerned with the setting of the proper environment for the development of curiosity. However, there always remains the question as to what can be done within the "proper environment" to stimulate curiosity further. In 1950, Berlyne (12) proposed a theory to assist in answering this problem. He postulated that:

> 1. When a novel stimulus affects an organism's receptors, there will occur a drive-stimulus-producing response which we shall call "curiosity."
>
> 2. As a curiosity-arousing stimulus continues to affect an organism's receptors, curiosity will diminish.

Later, Berlyne (11) listed other influences on curiosity. It could be increased "with the number of previous opportunities to gratify it in similar circumstances." Incongruity of a situation is also helpful in building curiosity. Establishing what might be called the surprise-conflict increases the curiosity drive. In order to study his theories Berlyne used figures with different properties. Those that increased curiosity were those showing (a) incongruity, (b) surprisingness, (c) relative entrophy, and (d) absolute entrophy.

Values of curiosity. -- Since many authors have suggested ways of improving curiosity, it may be assumed that they felt it was valuable. Other writers have been more specific in their claims regarding the merits of curiosity. Some writers such as George Macauley Trevelyan grant it a place of utmost importance in the academic world. In the preface to English Social History, Trevelyan wrote (117) that "disinterested intellectual curiosity is the life blood of real civilisation."

Earlier the French writer, Masson-Oursel (63) stated that "the cultivation of the mind is based on the development of curiosity." This writer went on to say that in order to be curious one has to be humble, attend to facts, seek out difficulties, raise problems, and be courageous in solving them.

Tuttle (118) claims that the entire field of exploration indicates how far human beings will go to satisfy curiosity. He goes on to say that such exploration may follow almost any subject. Curiosity leads not only to different geographical areas of the world but also into profound intellectual areas as well. Above all it finds its expression in scientific investigations. Roe (96) in an article appearing in 1961 in Science indicated that curiosity was a significant attribute in the lives of all the scientists she studied. Tuttle (118) tries to make it clear that modern science does not depend upon an increase in curiosity but only an increase in "the extent to which curiosity will drive man when techniques for its satisfaction have been devised."

One of the objectives for teaching science education in the schools must be the development of a "scientific attitude." However, such an attitude is an outcome of successful teaching, and is not present at the onset of instruction. According to Cordell (27), in the beginning, children are driven by their curiosity to find answers to everyday questions like what happens to animals in winter and what makes plants grow (27). Averill (2) feels that this curiosity deepens still more as he moves along in school and studies the material phenomena in his environment. He goes on to say that:

> Birds, flowers, insects, animals and their habitats; rain and snow and clouds and winds; people and products of climes; events of the past and of the present; elementary agriculture, chemical principles, electricity, communication, ... these subjects of the curriculum all tap well springs of curiosity in most children.

Hammond (46) urges that schools do everything possible to increase or maintain curiosity which he feels declines after the sixth grade level. He recognizes that some scientific advances are achieved through bursts of inspiration but only by those who are curious. Punke (95) points out that a high level of curiosity is not only important for scientists upon whose achievement the growth of our civilization depends but such curiosity is of paramount importance for laymen if they are to provide the proper milieu for the scientist. At least the laymen must understand this drive in those who go to extremes to find answers.

Several authors stated that the development of curiosity should be the most significant aspect of teaching. Lombard (60) claims that teachers and parents must encourage children to ask questions if they are going to develop inquiring minds. Brower (19), Executive Vice-President of Batten, Barton, Durstine and Osborn, expressed the opinion that even at the college level factual knowledge is far less important than curiosity, especially when it is coupled with discontent. In another article (20) he wrote that curiosity and discontent are "more important than 'genius'." He claimed that ordinary individuals who possess curiosity and discontent can make outstanding achievements.

But the value of sustaining and increasing curiosity among intelligent children can never be underestimated. Evans (37) said that supplying children with accurate information and encouraging them in critical thinking and dissent encourages them to be both self-reliant and original in their behavior. Thomson (112) suggests that by encouraging the child to be intellectually curious we help him build his own self-confidence.

The values of curiosity seem to be threefold:

1. Learning depends upon curiosity.
2. Creativity requires curiosity.
3. Sound mental health demands that the individual be curious.

The last point was emphasized by Branley (17) when he wrote, "People who are not curious are in a sense dead." Certainly they are not growing intellectually nor are they creating a better environment in which to live.

Although the exact nature of curiosity is not clear and although there is an uncertainty about what can be done about it, there is a consensus that the values of curiosity warrant a search for more knowledge about it. In the next section empirical investigations into aspects of curiosity will be examined.

Empirical Investigations Into Curiosity

Exploratory behavior, manipulation, and curiosity have been studied empirically. A large number of these investigations have been conducted in laboratory situations with subhuman species. A smaller number have been carried out with human beings.

If all of the important studies were reviewed in this report, more space would be required than could justifiably be allotted to them since they have been reviewed by Berlyne (10). In *Conflict, Arousal, and Curiosity* he has described the significant studies in this area.

It seems helpful, however, to review for the reader a few of these studies. Therefore, a small sample of investigations conducted both with subhuman species and human beings will be presented.

Empirical investigations with subhuman species. -- During the early part of the current century a definite exploratory drive was hypothesized. It was discovered that exploratory behavior will occur even when such drives as hunger and thirst are absent. In 1930, Nissen (85) demonstrated the existence of such a drive and showed experimentally that it was not as strong as maternal, thirst, hunger, or sex drives.

In order to study those aspects of curiosity subsumed under the rubrics of "exploratory drive" and "manipulation" several species of animals have been used. Although rats seem to have been employed with greater frequency than other animals, other species such as monkeys, mice, cats, dogs, hyenas, rhinoceroses, and even cockroaches have been studied.

The studies reviewed in this report have been limited to two major concerns: (1) the etiology of curiosity and (2) the elements that stimulate curiosity.

There are at least two theoretical positions which suggest that certain aspects of curiosity may be inherited. The Freudian school of psychoanalysis assumes that curiosity arises from the "looking impulse." This love of looking is known as scoptophilia. Some geneticists, for example Muller (82), state that certain characteristics of behavior are inherited -- at least to the extent that those underlying physiological structures necessary to carry out the functions are inherited. By implication this would include behavior labeled curiosity. It is reasonable to hypothesize that species curious about their environments survived; those who were not curious perished.

Carr and Williams (23) equated the level of curiosity of rats with the amount of movement shown as they explored a maze. They found that hooded rats explored more than black rats and that the latter were more curious than white rats.

McClearn (69) studied the exploratory behavior of two strains of mice. He examined them under several conditions and found that one strain was consistently more active in behavior categorized as exploratory than was the other strain. When the two strains were bred, the offspring showed behavior that was either more like the less active parent or intermediate to both parents.

There also may be a sex difference in the tendency to explore. Female rats have been shown by Thompson and Kahn (110) to explore more than male rats.

How important hereditary differences in curiosity are in human beings is a moot question. Certainly since a given family is living, it is evident that its members possessed the amount of curiosity necessary for its initial survival. Whatever these qualities are they may still be present today. There is, however, little evidence to support the hypothesis that differences in curiosity manifested by human beings are due mainly or even partially to differences in heredity. In fact, there is some evidence that hereditary differences fade away after prolonged exposure to a given environment. Kish and Antonitis (56) showed that there was a difference in the response of two strains of mice to the production of clicks made by landing on a platform. They interpreted this to mean that the one strain that landed more frequently was more curious than the other. However, after three days of testing the differences disappeared.

The nature of the activity described as exploratory seems to be quite complex. At this stage it is even difficult to ascertain whether all of the activity is really exploratory. Certainly there is some doubt that all of the activity is motivated by curiosity. Several studies by Thompson and others (107, 108, 111) with rats and dogs indicated that there was a tendency for "dull" animals to explore more than "bright" animals under some circumstances. They pointed out that dull animals may be more active in a new environment because they fail to remember similar settings in the past. Some animals may move about more to make up through tactile contacts for stimulation not available through other senses. Glickman (44) found that blinded rats were more active than normal rats in a Y maze.

Montgomery and Zimbardo (78) studied the effects of sensory and behavioral deprivation on exploratory behavior. They divided seventy-two rats into three groups of twenty-four. One group was raised in the usual cages; another group in cages that allowed a minimum of movement; still another group in cages that allowed a minimum of movement and sensory stimulation. After several trials in a standard Y maze for various lengths of time up to 100 days, the groups exhibited no differences in performance. The investigators concluded that exploratory behavior is not motivated by drives of boredom or need for exercise nor is it motivated by hunger.

Zimbardo and Montgomery (129) then studied another group of rats reared in an especially rich environment. This latter group explored the Y maze less than those reared in the usual cages. This finding may be interpreted to mean that exploratory behavior is manifested by animals when they find themselves in situations that are either more novel or more complex than their original environments.

Montgomery's (75) investigation of tamed and untamed rats gave additional support to this finding. In this study, tamed rats explored novel material more frequently than untamed rats. It can be conjectured that tamed rats are confined in a more restricted environment than their untamed counterparts. There are, however, other factors that complicate this interpretation. An element of fear may have had an inhibitory influence on the behavior of the untamed rats. Studies of the effects of fear are discussed later.

Since it is difficult to find environments increasingly rich in novelty and complexity, it is reasonable to assume that an animal will show less exploratory behavior as it grows older. Thompson and Heron (108) confirmed this hypothesis with dogs ranging in age from nine months to four years. The younger dogs were more active in exploring their environments.

It seems reasonable to assume that curiosity is in part inherited and in part learned. If the environment can be made increasingly challenging by its novelty or complexity, the individual may continue to react to it with exploratory and manipulative behavior. Darchen (30) provoked an increase in such exploratory behavior in cockroaches by introducing a green stick to the insects when they had been exploring a white one. That there is an optimum complexity for a specific individual is implied in the statement by Berlyne (14):

> Aestheticians have often asserted that an intermediate degree of complexity ... makes for a maximum appeal, the degree depending on personality traits. Too little complexity means insipidity and too much means bewilderment.

When the same material is presented repeatedly, there is a decline in exploratory behavior. Welker (123) presented chimpanzees with manipulable objects for several sessions. There was a decline in the handling of these objects from session to session. When new objects were introduced, however, a revival of exploratory behavior occurred. Berlyne (13) found the same thing to be true when he exposed rats to three identical objects for five minutes. Ten minutes later he exposed the same rats to the same situation but he had changed one of the objects. The new and different objects were explored more than the other objects.

The presence of a manipulable object tends to stimulate exploratory behavior. When Miles (73) placed kittens in a two-armed maze, they entered the arm leading to the manipulable object with a higher frequency than they entered the other arm.

New or novel changes in the environment can be brought about by altering the structure of the environment itself as well as by the introduction of new elements. Welker (124) working with chimpanzees found that they responded more to multi-colored rectangular blocks than to blocks of uniform color. Thiessen and McGaugh (106) found that adding an arm to a Y maze increased exploratory activity when the arm was added on the 81st trial.

The relationship between hunger and curiosity appears to be complex. If the nature of the home of rats is changed, it will interfere with eating (24). Mote and Finger (81) noted that rats previously satiated ran down a maze faster than rats unsatiated.

The relationship between fear and curiosity has been investigated by several writers. Apparently, fear arouses conflicts and the animal behaves in an alternating fashion -- first retreating and then approaching the object. Lorenz (61) describes this behavior in ravens while Hinde (50) reports this behavior in chaffinches.

Any attempts to interpret human behavior in terms of research conducted with subhuman species must be done cautiously. Although these experiments have produced interesting results they have merely raised questions as far as human beings are concerned since in many cases no effort has been made to test the findings with children and adults. In many cases such research would not be practical.

The interpretation of animal behavior at its best must be speculative -- one researcher drawing one conclusion and another just the opposite. For example, Welker (122) pointed out that rats may not be interested in the object they are exploring, but are merely trying to find a way out. For these reasons the few studies of curiosity in human beings have implications out of proportion to their number, especially for the present investigation.

Empirical investigations with human beings. -- Research in human curiosity has been limited. Although there have been several investigations of children's questions, there have been very few attempts to probe other aspects of curiosity.

The analysis of questions asked by children has long been considered the appropriate method for studying the nature of children's curiosity. This technique has been used with children at several ages living in different areas and countries. Siebert (101) in 1928 studied the questions asked by 6,419 pupils living in Germany. These pupils were requested to write out any question to which they wanted an answer. They did not sign their names, but they did give sex, age, and class. Boys contributed more questions than girls. More than 40 per cent of the questions indicated curiosity about subjects not taught in the schools. Children were more curious about nature and themselves than anything else. As children became older they showed more curiosity about spiritual matters at the expense of interest in the concrete. Girls were more curious about the spiritual than boys who expressed more desire to know something about politics and crafts.

Gatto (41) conducted a similar study in the United States with comparable results. He concluded that an analysis of children's questions would help diagnose the study abilities and disabilities of pupils. Gatto found that children differing in sex and age also differed in the areas in which they expressed their greatest curiosity. Gatto advised teachers to make more use of the questions of their pupils in determining the curriculum.

Some scholars formalized the questioning approach to curriculum. Baker (3), Kirkendall (55), and Jersild and Tasch (52) employed a questionnaire approach. Nature, the human body, and social adjustment were areas of greatest concern.

In 1932, Davis (31) analyzed 3,650 questions asked by 73 children. It was discovered that children are not curious about a thing that has not been encountered in some form in their own experiences. She reported that only 1.4 per cent of the questions did not appear to have an experiential base. In fact, 88 per cent of the questions resulted from the immediate situation.

Davis found the same sex difference as other investigators. In her study, boys asked for more causal explanations while girls were more curious about social relationships. She also reported that McCarthy had found a socio-economic difference in the quantity and quality of questions asked by the children.

Many of these findings were confirmed by Smith (104). She discovered that boys asked why and how more often than girls. The latter were more concerned with social rules, the names of things and asked more questions about places. She also found that among pre-school children there was an increase in the number and quality of questions with an increase in mental age.

Conn (26) continued the study with children up to twelve years of age. It was indicated in this study that the higher the IQ of the child the more questions he would ask. The number of topics asked about also increased with IQ.

An attempt to infer level of mental activity from the questions asked has also been made. Fahey and Corey (38) analyzed all the questions asked by 169 high-school pupils during one academic year. The questions were rated on a five-point scale. The average rating for each question was computed as was the mean level of complexity. Correlations were calculated for each of these computed scores and intelligence, school achievement, age, reading ability and appreciation, interests and accuracy, and consistency in thinking. They concluded that:

1. Several teachers working independently could infer mental complexity from an analysis of the questions the pupil asked.

2. Complexity and the length of questions are related.

3. The mean level of mental complexity is an individual difference and such differences are symmetrically distributed in the population.

4. These differences, however, are not significantly related to age and intelligence.

Other researchers have been concerned with the utilization of children's curiosity in the construction of courses of study and curricula. Morton (80) studied children's questions in order to determine the proper placement for the teaching of mathematical concepts in the schools. He asked pupils in grades one to eight to write questions about aviation. Their mathematical interests were measured on this basis. Questions were collected from 4,250 children. He found that:

1. All children were interested in size, number, and time, as they apply to aviation.

2. All children above the third grade were concerned with money and its relation to aviation.

3. Children, at all ages, were interested in the sociological aspects of the topic.

4. Questions pertaining to length, height, volume, and overall measurement were not influenced by sex.

5. The number of questions asked depended primarily upon how much prior exposure the child had had to the topic.

Studies of children's questions tend to give results that complement each other. However, the findings do not lend themselves to simple interpretations. Sex differences are revealed in many studies in the nature and quantity of questions raised. Is this an inherent difference or is it an artifact of our culture? There is evidence that children from different subcultures ask different kinds of questions. Several findings indicate that if a child does not have prior experience with a topic he is unlikely to ask questions in that particular area. Since boys and girls have different experiences they would tend to ask different questions. Age differences also might be attributed to experiential backgrounds of the questioners as well as to age. Certainly there appears to be some commonality in questions wherever the experiential backgrounds of the questioners are similar. Questions about nature, society, and the individual himself are of the latter type. Such areas of commonality can be helpful in planning future educational experiences.

Investigations based on children's questions assumed the presence of something that might be classified as curiosity. These studies indicated that curiosity does differ from group to group under different circumstances. The reasons for such differences were studied very little directly and almost no effort was made to determine the nature of curiosity itself or how it could be increased or depressed.

Vinacke (119) stated that:

> The consequences of exploring and manipulation depend upon what there is to explore and manipulate, upon the codes which govern the child's activities, and upon the rewards which accrue from them. At the same time the child's own tissue system determines to a large degree how active he is in exploring, how rapidly he develops, and how strongly he reacts emotionally.

The value of approval in curiosity is seen clearly in a study by Gewirtz (42). Fifty-six children - twenty-eight boys and twenty-eight girls - painted at an easel in the presence of an adult. The children were of kindergarten age. When adults were less available for help the number of attention-getting devices increased. Boys sought more attention from women - significant at the .01 level. Girls sought more attention from men, but the finding was not statistically significant.

There appears to be a reciprocal relationship between creativity and curiosity. Whenever one engages in a creative act, the first aspect of the act is characterized by exploratory and familiarizing behavior. Patrick (91) analyzed the thought processes of poets and decided that curiosity played a major role in creativity.

Curiosity directed toward creativity seems to be purposive. This idea has given rise to an attempt to distinguish among types of curiosity. Berlyne (7) tried to develop a theory of human curiosity utilizing the idea that there were at least two kinds. The seeking of increased stimulation from the environment as seen in the behavior of lower animals and sometimes in human beings, he labeled "perceptual curiosity." The type of behavior seen in the creative person, whether in the arts or the sciences, he termed "epistemic curiosity." This was defined as a drive reducible by knowledge rehearsal.

Berlyne (6) designed an experiment to test aspects of epistemic curiosity. The experiment included the following elements:

1. A pre-test about invertebrate animals.
2. Statements that included answers to these questions.
3. A post-test similar to the first test.

The findings indicated that:

1. Pre-questioning arouses curiosity.
2. Statements recognized as answers to questions from the fore-questionnaire are more likely to be recalled in the post-questionnaire.
3. Questions about more familiar animals and those whose concepts seem incompatible increase curiosity.
4. Statements containing an element of surprise are recalled more frequently than other statements.

Berlyne (11) also tested his theory regarding perceptual curiosity. He asked subjects to push a key to produce tachistoscopic exposures of visual figures. He used the number of responses as a measure of the intensity of curiosity aroused by a figure. He found that incongruity, surprisingness, relative entropy, and absolute entropy increased curiosity. The findings in this study were so similar to those found when epistemic curiosity was investigated that a question is raised as to whether or not it is possible to dichotomize curiosity into epistemic and perceptual. It is quite possible that both are part of the same continuum.

Dember and Earl (32) classify exploration, manipulation, and curiosity as attention. They concluded that these forms of behavior were responses to stimuli that tended to "increase the psychological complexity of the individual who perceived them." If this grouping is accurate, then attempts to study attention should help one understand the nature of curiosity.

When ten tests of "attention" were factor-analyzed by Sullwold (105) three factors were extracted and interpreted. These factors were "span of attention," "ability to form a preparatory set," and "ability to isolate certain aspects of a situation from others."

The evidence regarding whether curiosity is unidimensional or multidimensional is still inconclusive. Travers and others (116) discuss curiosity as a factor in complex problem solving. There is some evidence, however, that there are several factors involved in the behavior categorized as curiosity. Berber (5) identified several drives and tendencies purported to form the basis of curiosity.

Personality correlates of curiosity have been explored, especially in recent years. Kagan and others (54) analyzed personality variables indicated by Rorschach and TAT tests with changes in IQ. They found that children with maximum increases in IQ showed greater need achievement, more competitive striving, and more curiosity about nature than those children with great losses in IQ.

In 1961, McReynolds and others (71) studied the relationship of curiosity to psychological adjustment in children. Thirty pupils - fourteen girls and sixteen boys - in a sixth grade classroom were given an object curiosity test. This test was administered by a special examiner and consisted of several tangible items. Children were evaluated as to their responses to these items. The teacher, independent of the examiner, rated the pupils on ten behavior variables. Curiosity, as tested, correlated positively with over-all psychological health (.45), scholastic motivation (.43), creativity and originality (.20), activity level (.03), and curiosity as observed (.37). Object curiosity correlated negatively with nervous behavior (-.42), worry over achievement (-.27), maladjustment in the classroom (-.50), maladjustment to teacher (-.42), and maladjustment to peers (-.39).

Summary

Although there is a considerable body of literature pertaining to curiosity, a large proportion of this literature is in the form of opinions or theoretical statements. Some of these date back to the Old Testament.

There is a large amount of empirical information. The bulk, however, is based upon studies with animals. In recent years there has been an increasing emphasis on research with human subjects.

Many psychologists representing divergent schools of thought have speculated on the question of curiosity. They have sought answers, primarily, for three questions:

1. What is the nature of curiosity?
2. What are the ways of stimulating or depressing curiosity?
3. How valuable is curiosity to society?

It is of interest to note that this attribute has not always been considered a positive characteristic. In fact, it was to be avoided. While the residue of this opinion still seems to permeate some aspects of our society, for the most part, the opinion seems to be that curiosity is necessary for survival in a scientific age.

The empirical investigations have been conducted with many types of animals from cockroaches to monkeys. In these studies, exploratory and manipulative behavior are considered manifestations of curiosity. Investigators have been concerned primarily with the etiology of curiosity and with variables which seem to be influential in its development. Such variables as novelty of environment, richness of environment, heredity, intelligence, hunger, fear, and sex have been investigated.

The nature of human curiosity has only recently been studied to any extent. Earlier investigations were concerned primarily with the quantity and quality of questions the subject asked. These studies of questions indicated that such variables as intelligence, socio-economic status, sex, and age made a difference in the content and number of the questions reported. Boys, for example, asked more questions requiring causal explanations while girls asked more pertaining to social relationships.

Other investigators have looked at the relationship between curiosity and attention, curriculum development, and creativity. There appears to be a very close reciprocal relationship between curiosity and creativity.

Recently, there has been an increasing awareness of a relationship between curiosity and psychological adjustment. Such aspects of personality as need for approval, scholastic motivation, nervous behavior, need for achievement, and social maladjustment have been studied.

Several questions have arisen regarding the nature of curiosity. Some writers have suggested that there may be at least two kinds of curiosity. Berlyne calls these "epistimic" and "perceptual." Others question whether the attribute is unidimensional or multi-dimensional. There is very little in the literature upon which to base anything more than a tentative answer at this time.

The review of the literature indicates a dearth of information regarding curiosity. What is known is quite tenuous. There are more questions than answers.

CHAPTER III

Establishing Validity

In attempting to develop measures of any characteristic, validation is one of the problems that must be faced. Therefore, before any instruments were constructed to test curiosity in elementary school children it was necessary to decide upon procedures for validation.

Three steps were taken to determine criterion groups that could be used for validation. First, curiosity was defined in terms of children's behavior. Secondly, children's behavior was rated by several judges. Finally, variables that might influence such judgments were studied.

Defining Curiosity

In order to develop a definition of curiosity for this investigation several steps were taken. These included:

1. Informal inquiries of students and faculty of a university.
2. A formal inquiry of a group of college sophomores.
3. A review of dictionary definitions including those found in the Oxford Universal Dictionary.
4. A survey of the literature both ancient and modern and theoretical as well as empirical.

Informal inquiries. -- For several weeks, the principal investigator asked students and faculty members what they thought was meant by the term "curiosity." They were usually asked two questions:

1. What is curiosity?
2. Is curiosity bad or good?

Approximately a week after the first inquiry, the same students and faculty members were asked about such terms as inquisitiveness, nosiness, and exploratory behavior.

No effort was made to statistically analyse the replies. They indicated that students and faculty members often defined curiosity in terms of behavior that might logically be classified under other terms. When they were asked if they considered curiosity to be bad or good, they usually responded that they thought it was good. However, there were many reservations expressed. When a week later the same persons were asked whether they thought the related terms were bad or good, their responses reflected negative evaluations more frequently than when they were asked directly about curiosity itself.

While these inquiries did not result in any clear-cut definition, they did furnish a list of words which the respondents considered to be somewhat synonymous with curiosity. These words, together with others selected from Thorndike's Word List (113), were utilized in constructing a list for a more formal approach used with a class of undergraduate students in Human Growth and Development.

Formal inquiry. -- Forty-six college sophomores were asked to rate on a 0-to-4 point scale the extent to which each of forty-two words describes a person who exhibits curiosity. If the word could be used to describe someone with a very high degree of curiosity, it was given a 4; if used to describe someone with a relatively high degree, it was given a 3; if a moderate amount, a 2; if low, a 1; and if the word could not be used to describe the degree of curiosity of a person, it was given a 0. The following words were used: adventurous, big-eyed, busybody, dazzled, discoverer, explorer, examining, estimates, eyeing, experimenting, impatient, inquisitive, inquiring, inventive, interested, leering, manipulating, messing, pathfinding, peeking, peering, pondering, pioneering, probing, prodding, poking, proving, prowling, puzzled, researchful, searchful, scavenger, scouting, searching, seeking, questioning, spying, tinkering, thinking, venturesome, wanderer, and wonderer.

The following words were rated from relatively high to very high as descriptions of persons with curiosity:

1. explorer
2. discoverer
3. experimenting
4. adventurous
5. researchful
6. inquisitive
7. pioneering
8. probing
9. questioning
10. examining
11. inquiring
12. searchful
13. inventive
14. searching
15. seeking

The following words were rated from moderate to relatively high as descriptions of persons with curiosity:

16. venturesome
17. pathfinding
18. proving
19. wonderer
20. busybody
21. thinking
22. scouting
23. interested
24. spying
25. peeking
26. peering
27. eyeing
28. prodding
29. big-eyed
30. pondering

The following words were rated from low to moderate as descriptions of persons with curiosity:

31. poking
32. wanderer
33. prowling
34. tinkering
35. scavenger
36. estimates
37. puzzled
38. manipulating
39. dazzled

The following words received an average rating of less than 1 as descriptions of persons with curiosity:

40. leering
41. impatient
42. messing

By analyzing these data, the following points were identified as summarizing the subjects' views of curiosity:

1. Any viewing of the environment may be considered as being in part derived from curiosity.
2. Curiosity, however, seems to include more than random undirected scanning.
3. There seems to be an element of reaction on the part of the observer to what is observed.
4. There seems also to be a purpose to observing.
5. This purpose seems to be primarily that of attaining more knowledge and understanding about the environment being scanned.
6. Furthermore, there seems to be a persistence in seeking knowledge and understanding about the environment being scanned.

Although most words given a high rating by the class corresponded closely with terms used by researchers to classify behavior similar to curiosity (25), the relationship was not perfect. For example, manipulating activities are often considered as indications of curiosity. However, this class, as a whole, did not include them.

Dictionary definitions. -- Before developing the definition of curiosity to be used in this study, it seemed advisable to examine the dictionary definitions of words considered synonymous with curiosity as well as of words that were not considered to be closely related. For this purpose the ten words given the highest rating by the class and the ten words given the lowest were used.

The following definitions were obtained for the first ten words:

1. explorer -- "One who seeks for or after; one who strives to attain by search."

2. discoverer -- "One who first finds out the existence or truth of something hitherto unknown, as by exploration, experiment, research, or reasoning."

3. experimenting -- "The act of conducting a trial or special observation to confirm or disprove something doubtful."

4. adventurous -- "Inclined to adventure, willing to incur hazard, prone to embark on hazardous enterprises, rashly daring."

5. research -- "Careful or diligent search."

6. inquisitive -- "Given to examination, investigation, or research; disposed to ask questions, improperly curious."

7. pioneer -- "To dig out or open up for others to follow, also to discover or explore in advance of others."

8. probing -- "To investigate thoroughly, especially by questioning."

9. questioning -- "Inquiring."

10. examining -- "Inspecting carefully to discover the real character or state of; subjecting to inquiry or inspection for the purpose of obtaining a fuller insight into; investigating, scrutinizing, testing."

The following definitions were obtained for the last ten words:

33. prowling -- "To rove over, through, or about *as if* searching or on the lookout."

34. tinker -- "To make futile attempts to mend."

35. scavenger -- "Collects and disposes of unclean things."

36. estimate -- "Judgment based on careful consideration or valuation."

37. puzzled -- "Being perplexed, state of perplexity."

38. manipulate -- "To treat, work, or operate with hands."

39. dazzled -- "To be overpowered by light, to have vision confused by excess of light."

40. leering -- "Looking askance or obliquely, to look with a suggestive expression as of hatred, contempt, or lust."

41. impatient -- "Not patient, restless, uneasy, irritable, fretful."

42. messing -- "Confusing, disagreeable, mixing."

A review of these definitions indicates that curiosity is more than idle scanning of one's environment, although such scanning seems to be essential to its functioning. One of the chief properties of curiosity seems to be a desire to know more and more about the environment. Another appears to be persistence in seeking such knowledge.

In the dictionary, curiosity is defined as "the disposition to inquire into anything, especially something strange, often implying *meddlesomeness* or inquisitiveness." In order to understand this definition more clearly, the development of the meaning of this word was reviewed in the *Oxford Universal Dictionary*.

The word itself is an adoption of the old French word *curioseté* and an adaptation of the Latin word *curiositatem*. It appeared in the English language during the Middle English period.

During the years following its introduction several meanings were attached to the word. Although most of the definitions are now obsolete, the residue of these earlier meanings seems to permeate the connotations of the word at the present time.

Although several meanings have been given to the word since its introduction into the English language, the meaning used before 1577 is still used today, namely, that it is the "desire to know or learn; inquisitiveness about trifles or other people's affairs." In 1645 it was defined as "anything curious, rare, or strange."

By 1661, curiosity was synonymous with hobby. Before the end of the seventeenth century it meant scrupulousness and accuracy. During the first quarter of the eighteenth century, the meaning shifted and curiosity was defined as "a vanity, a refinement, a fancy, a whim." Later in the century curiosity meant carefulness, undue niceness and even ingenuity. Finally it took on the meaning of scientific and artistic interest and in the nineteenth century included the idea of careful and elaborate workmanship. Throughout the entire history, however, some aspect of desiring to know remained.

Review of the literature. -- In Chapter II, some of the literature pertaining to curiosity was reviewed. It will not be examined here, but an analysis of the literature was helpful in deriving a definition of curiosity for this study.

From the analysis of theoretical statements and reports of research on curiosity, it may be concluded that curiosity is a transactional function of the biological organism and the environment of which it is a part. It is probable that curiosity has a biological basis and that survival depends, in part, upon the organism's knowing its surroundings and keeping constantly in touch with any changes that may occur. It is possible that those members of the species who survived possessed certain characteristics of curiosity which were inherited by their descendants.

In order to survive, the organism must constantly scan its surroundings and function in terms of the information thus obtained. It is presumed that the information is interpreted by the organism in terms of its own perceptions of the stimuli which it explores. It is further assumed that the complexity of the situation will determine the amount of information available; past experiences of the organism will give a basis for evaluating the information; spatial freedom for choice will permit the consideration of several possible ways to come to terms with the environment; and the possession of sufficient physical and psychic energy will allow the organism to weigh ever-increasing amounts of information before coming to any final terms.

It would seem that if a new situation were identical with one with which the organism had had prior success, no curiosity would be manifested since the organism and the environment would have reached a stage of dynamic equilibrium. Any desire to know more would be reduced to a minimum and the organism would be satiated. It may be conjectured that this condition is one sought by the organism but that it is illusory. No two situations can ever be perceived by the organism as being identical. The very act of satisfying the drive to know about the surroundings has altered perception of them and new unknowns are created. Curiosity may be defined as a drive whose satisfaction actually acts as a feedback causing the drive to be increased rather than to be reduced. Thus the very effort of the organism in the environment to reach homeostasis seems to lead to a new nonhomeostatic relationship because the knowing of what was once unknown reveals new unknowns. The strange, new, incongruous, or mysterious elements of this newly created situation stimulate further curiosity. Such a process would continue ad infinitum if the organism had the energy, physical or psychic, to persist or if curiosity did not lead to incidents which were fear-provoking because they became overwhelming for the powers of the organism. If the organism has had prior success under somewhat similar circumstances, curiosity may be accelerated. On the other hand, if the prior experiences have been frightening, curiosity may be retarded.

Curiosity may be categorized under the term motivation. It appears to be important to creativity and problem solving. It seems to be intimately related to interest, the latter being somewhat more crystallized.

Curiosity may be thought of as the growing edge of interest. In the first encounter with a particular object or area of knowledge, the person is aroused to curiosity by the novelty of it. Interest may develop as the person satisfies his curiosity, but curiosity is again aroused as new aspects of the subject are perceived. Either curiosity or interest may exist without the other. Whenever the person ceases to see anything new about the subject of his interest or whenever he lacks the desire to know more about it, he may have an interest without curiosity. Certainly before his early scanning behavior has become particularized he has curiosity but lacks interest in specific things or areas.

A definition of curiosity. -- For the purposes of this study, an elementary school child is said to exhibit curiosity to the extent that he:

1. reacts positively to new, strange, incongruous, or mysterious elements in his environment by moving toward them, by exploring them, or by manipulating them
2. exhibits a need or desire to know more about himself and/or his environment
3. scans his surroundings seeking new experiences
4. persists in examining and exploring stimuli in order to know more about them.

Attempts to Judge Curiosity of School Children

In order to establish criterion groups to be used in validating instruments designed to measure curiosity, the level of curiosity of children composing these groups had to be ascertained. The behavior of elementary school children had to be observed and evaluated in terms of curiosity as defined.

Since it was impractical to observe a sufficient number of children under enough circumstances to obtain reliable judgments, it was necessary to rely on judges who had already observed the children at many times in numerous situations. The teachers, the peers, and the children themselves were thought to be the best available judges.

Teacher judgment of curiosity. -- In each class, the pupils were ranked by the teachers on a special form to assure a degree of uniformity in the ranking. The form, which consisted of a single sheet with spaces numbered consecutively, provided sufficient places for the names of all children in a single classroom.

An instruction sheet setting forth the procedures to be followed was attached to the rating sheet. The instructions were in two parts. In Part I, each teacher was asked to rank the pupils in the following manner:

1. Write the name of the child you consider to have the most curiosity on the first line.
2. Write the name of the child you consider to have the least curiosity on the line corresponding to the number of pupils in your class.
3. Next, write the name of the child you would rank second in curiosity on line two.

4. Then write the name of the child you consider to have next-to-the-least curiosity on the line above the name of the child having the least curiosity.

5. Continue ranking in this manner until you have ranked all of the children in your class.

Part II consisted of the definition of curiosity together with the following illustrations of behavior as typical of each aspect of the definition:

1. Scans his surroundings looking for new experiences. (For example, if there is something new in the room, he notices it.)

2. Moves toward new, mysterious, or incongruous elements in his environment, either physically or psychologically. (For example, he approaches and/or asks questions about a strange object found on the playground.)

3. Examines, explores, and/or manipulates new, mysterious or incongruous elements in his environment, either physically or psychologically. (For example, he looks at and/or handles, studies, asks questions about, reads about, discusses a remote-control doll another child has brought to school.)

4. Persists in such examinations, explorations, and/or manipulations. (For example, keeps studying about the remote-control doll until he understands how it works.)

During the second preliminary study, the teachers of seven fifth-grade classes made two rankings of their pupils, the second ranking being made approximately eight weeks after the first. Spearman rank order correlations were calculated. An approximate mean r of .77 was obtained which is probably an underestimate of the reliability of the teacher judgments since the two rankings were separated by sufficient time for true changes to take place. Table 1 shows the rank-order correlation coefficients and approximate product-moment correlation coefficients for the two rankings on curiosity made by seven teachers.

true changes to take place. Table 1 shows the rank-order

Peer judgment of curiosity. -- Since the procedure used with teachers appeared to be too complicated for the majority of children to use to evaluate their peers, another instrument was developed. This instrument, a Who-Should-Play-the-Part test, asked the children to pretend they were selecting some of their classmates to play roles.

Each child was given a list of the names of classmates. At the same time, they were given a description of eight roles--four of children whose behavior could be classified as exhibiting much curiosity and four whose behavior showed little or no curiosity. Each child was told to select from the list of classmates names of the children who were usually most like the characters required for the play. They were

TABLE 1

RANK-ORDER CORRELATION COEFFICIENTS AND APPROXIMATE PRODUCT-MOMENT CORRELATION COEFFICIENTS FOR TWO RANKINGS OF CURIOSITY MADE BY TEACHERS IN THE SECOND PRELIMINARY STUDY

Teacher	N	Rho	Approximate r
A	28	.63	.65
B	29	.80	.81
C	28	.52	.54
D	28	.72	.74
E	29	.95	.95
F	30	.74	.76
G	29	.93	.94
			(mean .77)

given permission to use two names for each role if they thought they should. They were also told they could use their own names. The children were urged not to use any name, including their own, more than one time.

The roles which were to be filled by classmates were the following:

Part 1. This part will be played by a classmate who keeps working for a long time trying to understand anything new which can be examined. This pupil sticks to problems trying to solve them. This member of the class is the last to give up when the class is looking for answers to questions. This pupil keeps asking questions after everyone else has stopped and will remain working on strange things after others are gone. This pupil often takes things apart but will work a long time to put them together to find out how they work.

Part 2. This part will be played by a pupil who is always eager to examine new things and considers them in different ways. This pupil is willing to try new games and is often called nosy, but this classmate has more experiences to tell about than anyone else.

Part 3. This part will be played by a pupil who always rushes toward new and strange things. This pupil is always asking questions and begs the teacher for permission to look at things that are new and different. This classmate often gets into trouble for rushing to the door when strangers come and for running to the window when something is happening outside. No matter what is going on this pupil seems to ask more questions than other members of the class.

Part 4. This part will be played by a pupil who seems to watch everything that is going on. This pupil seems to see everything and is the first to notice anything strange or new. Often this pupil seems to be looking around at things which other class members hardly notice.

Part 5. This part will be played by a pupil who doesn't get interested when someone brings a new puzzle to class. If someone has something strange or queer, this pupil does not pay much attention

thing strange or queer, this pupil does not pay much attention

to it. This pupil never takes things apart to see how they are made. This classmate wants to change what he is doing very often or to abandon any task that seems hard.

Part 6. This part will be played by a pupil who guesses about things instead of looking at them closely. Even when looking at things this pupil misses important parts of them. Instead of trying new things, this classmate seems to be trying to escape them. Some people think this pupil is shy for hesitating so often to examine and explore things. In telling about things, this classmate often neglects to tell important parts of the story.

Part 7. This part will be played by a pupil who seems to avoid asking questions. When something new or strange happens this classmate seems to withdraw from it. This member of the class loses interest very quickly and refuses to rush into new things. When something new is brought into the classroom, this pupil is usually standing in back of the others who are looking at it and is the first to leave a group where someone is showing something new. This classmate often pokes fun at things because they are different.

Part 8. This part will be played by a pupil who misses seeing the things that other members of the class see easily. Even when doing very little, this pupil is not easily disturbed by things that happen in the classroom. When something new or strange is brought into the classroom, this classmate often does not look at it or just gives it a slight glance.

In order to obtain an estimate of reliability for this instrument, each class used in the second preliminary study was divided into two equal parts. Wherever a class was composed of an uneven number of children, one paper was eliminated by a process of random selection. The children were ranked according to the ratings each received from each half of the class. Rank order correlations were calculated for each class. The mean correlation coefficient for the seven classrooms was .45.

Self judgment of curiosity. -- In addition to the ratings by peers and teachers, it was considered desirable to get some idea of how the pupils felt about their own curiosity. Neither the procedure set forth for teachers nor the instrument used by the peers could be used effectively by the pupils to rate themselves. Therefore, a special instrument was developed. This instrument consisted of 41 items. Each of the items was selected to measure behavior logically considered to indicate some aspect of curiosity as defined. Some items were stated in positive terms, others in negative terms. Each child was asked to mark in the appropriate space the extent to which each item pertained to him. The children were told there were no "right" or "wrong" answers, but that the best answer was what they thought was true about themselves. The following are examples from the self-rating instrument[1]:

When I see a neighbor digging in his yard, I wonder what he is doing.
_____Never _____Sometimes _____Often _____Always

I question things that I read or see.
______Never ______Sometimes _____Often _____Always

When there is something new in the room, I notice it right away.
_____Never _______Sometimes _____Often _____Always

---

[1] See Appendix A for the complete instrument.

I take things apart to see how they work.

_____Never _____Sometimes _____Often _____Always

I like to discover new things.

______Never _____Sometimes _____Often _____Always

When I see a strange machine, I go up to it and look at it.

_____Never _____Sometimes _____Often _____Always

An estimate of reliability of the instrument was obtained with the 158 cases comprising the population of the first preliminary study. By using the split-half method with the first 40 items and the Spearman-Brown formula for correction, an estimated reliability of .91 was obtained.

Combined judgment of curiosity. -- Since three methods were used to determine validity, the question of whether these techniques should be used individually or collectively arose. If curiosity is not assumed to be a unidimensional variable, and if each type of judgment is considered as evaluating slightly different aspects of the variable, then by combining all three judgments in a composite rating, a more comprehensive estimate of curiosity might be obtained. On the other hand, if curiosity is assumed to be a unidimensional variable and each type of judgment is considered to be an evaluation of that single dimension, each judgment could be used interchangeable with the others. Since it is not known at this time whether curiosity is unidimensional or multi-dimensional, it seemed better to assume the latter to be the case.

In order to determine whether judgments made with instruments based on the definition by persons observing the pupils from different points of view were in fact accounting for several dimensions of curiosity, an estimate of the amount of variance accounted for in common by the different types of judgments was obtained. Rank-order correlation coefficients were calculated for each of the classrooms used in the first preliminary study. The mean of the correlation coefficients between self judgment and peer judgment was .15; between self judgment and teacher judgment, .11; and between teacher judgment and peer judgment, .54.

The low correlations between self measurement and the other two ratings raised the question of whether the self-rating instrument measured any aspects of the variable that were measured by the other instruments. It was for this reason that only peer judgments and teacher judgments were used in selecting the criterion groups in the first preliminary study. This procedure will be described later. When the self judgments of the children of the high and low criterion groups were examined, it was discovered that, on the whole, children in the high curiosity group gave themselves higher scores on curiosity than did children in the low curiosity group. The difference between the means was significant at the .005 level. This information prompted a reconsideration of the use of self judgments in constructing composite ratings for the second preliminary and final studies.

Factors Influencing Judgments of Curiosity

It was anticipated that certain factors might have some influence on the judgments of the evaluators. Among the factors considered were age, race, popularity, sex, and intelligence.

Age of pupils as a factor in evaluations. -- The range of age was kept within narrow limits by restricting the study to one grade level. The fifth grade was selected to lessen the number of developmental reading problems of the group and to secure children whose interests were less crystallized than is generally the case in adolescence.

The means and standard deviations of the ages of all the children participating in each of the three studies were calculated. The means for the first, second, and final studies were 130.84, 130.38, and 130.43, respectively. The standard deviations were 6.38, 7.22, and 8.30. The differences among the standard deviations were not significant at the .05 level when Bartlett's test of the assumption of equality of population variance was employed.

The influence of the age of a pupil on judgments of teachers and peers was examined. To do this all classes constituting the two preliminary studies and a random sample of classes from the major study were divided into halves both in terms of teacher judgment and peer judgment of curiosity. The sample in the major study consisted of five classes selected by the use of random numbers. Altogether the differences between the means and the variabilities of ages were calculated for thirty pairs of groups (fifteen based on teacher judgment and fifteen based on peer judgment). The difference between the means of the ages of the children composing the higher and lower curiosity groups did not approach the .05 level of significance in a single case. In three cases the difference in variability of the ages reached significance at the .05 level with the ages of the low-curiosity children being more variable. Although the means were not significantly different, nineteen of the means were higher among the low-curiosity groups.

Race of pupils as a factor in evaluations. -- There were too few Negroes to provide conclusive evidence of whether race affected the ratings on curiosity. In the first preliminary study there were thirteen Negroes. There were proportionally fewer Negroes in the second preliminary study and in the major study. In the first study, there were six Negroes in each of two rooms. In one of these, the teacher and the pupils placed the same three Negro children in the upper half of the class in curiosity and the other three in the lower half. In the other room, the teacher placed five of the children in the upper half while the peers judged four to be in the lower half. By Fisher's Exact Probability Test this difference was not found to be significant at the .05 level.

Popularity of pupils as a factor in evaluations. -- The popularity of individual pupils was another factor which logically could have been an influence in determining the ratings of pupils in terms of their curiosity. It was necessary to determine whether teachers and peers tended to rate popular pupils high in curiosity and less popular pupils less high.

In order to determine whether the popularity of the children had influenced the ratings, the *Ohio Social Acceptance Scale* was administered. This scale is a sociometric device in which every pupil in a classroom is given a rating from one to six by every other pupil in the classroom. The ratings given an individual child by his classmates are totalled. This score is his measure of social acceptance or popularity. Since a one is given by the pupils to their "very, very best friends" and a six is given to those they "do not like to work with" or "would rather not talk to," children with the lower scores may be considered to be the more popular children in the classroom. The authors are unaware of norms published on this scale. These would be unnecessary in the present study, so it would appear, since it is the relative position held by each child in the group that is important.

Since the teacher's judgments were obtained by ranking, non-parametric techniques were used to determine what relationships, if any, existed among teacher ratings, peer ratings, and popularity. The rank-order correlation coefficients between peer judgment of curiosity and ranks based on the *Ohio Social Acceptance Scale* ranged between .22 and .47. The correlations between teacher judgment of curiosity and ranks according to the *Ohio Social Acceptance Scale* ranged from .12 to .55. These data were based on five rather than six classrooms since conditions prevailing within one classroom made the administration of a sociometric device impractical.

Since low to moderate positive correlation coefficients were obtained between peer judgment and popularity and between teacher judgment and popularity, it was essential to determine to what extent peers and teachers were actually judging popularity rather than curiosity. It was stated earlier that composite judgments were to be used in establishing criterion groups. After calculating the relationship between peer judgment and teacher judgment, using Kendall's tau, the effect of popularity was partialled out. Table 2 given below shows that although all partial taus were depressed from the taus, the amount of depression in all cases was slight. This demonstrates that the agreement between the rankings by peers and teachers did not depend upon popularity.

Further confirmation that teachers and peers were judging something besides popularity was obtained by analyzing the popularity of children comprising the criterion groups of the first pilot study. These groups are described later in this chapter. Although children judged to be high in curiosity were slightly more popular than those judged to be low, neither the difference between means nor the difference between the variabilities of the two groups was significant at the .05 level when the t and F tests were used. Since the results obtained did not warrant controlling for popularity, the *Ohio Social Acceptance Scale* was administered in only the first preliminary study.

TABLE 2

AGREEMENT BETWEEN TEACHERS AND PEERS IN RANKING PUPILS IN FIVE CLASSROOMS AS TO THE EXTENT TO WHICH THEY EXHIBIT CURIOSITY WITH THE EFFECT OF POPULARITY PARTIALLED OUT

Room	N	Tau	Level of Significance	Partial Tau
A	31	.37	.0018	.31
B	30	.33	.0052	.30
C	34	.23	.0188	.21
D	30	.42	.0005	.39
E	28	.36	.0025	.33

Sex of pupils as a factor in evaluations. -- It was hypothesized that the sex of the child might influence the judgment of curiosity by the child's peers and teachers. In other words, it seemed desirable to know to what extent, if any, the child's sex influenced his or her rating in terms of curiosity.

It has been rather consistently reported that, in our own society, there exists considerable distance between the sexes at pre-adolescence. If such were the case in these classes, did it influence the judgments? To answer the question, the curiosity rankings of the children in the first preliminary study were analyzed. One class was eliminated from the study because of circumstances which made the data collected from that room of questionable reliability. The rankings which pupils of each sex gave to the same sex were correlated with the rankings given to the opposite sex, i.e., the rankings boys gave to boys were correlated with the rankings girls gave the same boys. Table 3 shows that these correlations were all positive ranging from .23 in Room A between girls' judgment and boys' judgment of girls to .86 in Room D between boys' judgment of boys and girls' judgment of the same boys. Table 3 shows that the correlations between teachers' judgments of girls and boys' judgments of girls and between teachers' judgments of boys and girls' judgments of boys were also positive.

While these findings indicated that there was considerable agreement among boys, girls, and teachers in judging curiosity, they did not answer the question of whether, on the whole, members of one sex were judged to be more curious than members of the other. Two approaches were made to answer it. The differences between the means of the scores the peers had assigned to the boys and girls and the differences between the number of boys and girls the teachers had placed in the upper and lower halves of the classes were examined.

TABLE 3

AGREEMENTS BETWEEN GIRLS' JUDGMENT OF GIRLS AND BOYS' JUDGMENT OF GIRLS; BOYS' JUDGMENT OF BOYS AND GIRLS' JUDGMENT OF BOYS; TEACHERS' JUDGMENT OF GIRLS AND BOYS' JUDGMENT OF GIRLS; AND TEACHERS' JUDGMENT OF BOYS AND GIRLS' JUDGMENT OF BOYS IN FIVE FIFTH-GRADE CLASSES AS TO THEIR LEVEL OF CURIOSITY

Room	GG-BG	BB-GB	TG-BG	TB-GB
A	.23	.76	.27	.36
B	.78	.69	.60	.20
C	.65	.33	.62	.56
D	.47	.86	.62	.46
E	.69	.56	.72	.55

BB -- Boys' judgment of boys
BG -- Boys' judgment of girls
GB -- Girls' judgment of boys
GG -- Girls' judgment of girls
TB -- Teachers' judgment of boys
TG -- Teachers' judgment of girls

Table 4 shows the mean and variance of peer judgment of curiosity of boys and girls for each class. It shows that in three of the classes the boys were assigned scores that were significantly more variable than those assigned to the girls. Since the differences between some of the variances were significant, the differences between the means were tested with the Mann-Whitney U test. An examination of the means reveals that in some classrooms the girls' means were higher than the boys' means. In others, the opposite was true. In no case was the difference significant.

Although, on the whole, teachers placed more boys than girls in the upper halves of the classes and more girls than boys in the lower halves, this arrangement was not consistent in all classes as is shown in Table 5. When tested, using the chi-square technique, the differences were found not to be significant at the .05 level.

In light of this evidence based on five classrooms used in the first preliminary study, it seemed safe to assume that the ratings were not unduly influenced by sex preference. When criterion groups were selected, however, care was taken to see that the differences between the number of boys and girls selected was not large since some of the items used in the tests might possibly be biased in favor of one sex or the other.

Intelligence of pupils as a factor in evaluations. -- It is logical to assume that curiosity and intelligence are related. Casual observation, however, indicates that there are persons with high intelligence who tend to show little curiosity about their environments. On the other hand, it has also been observed that some children with relatively low IQ's seem anxious to know about things around them.

An examination of five classes in the first preliminary study revealed positive moderate correlations between teacher judgment of curiosity and IQ and somewhat lower positive and less consistent correlations between peer judgment of curiosity and IQ. Table 6 shows these relationships. All of these correlations were significant at the .05 level or better.

Since it is likely that a positive relationship does exist between intelligence and curiosity and since some of the tests developed to measure curiosity might logically also seem to be measuring devices for intelligence, it was necessary to control for intelligence. Two procedures were used. One method was used in the first preliminary study; the other method was used in both the second preliminary study and the major study.

TABLE 4

NUMBER, MEAN, VARIANCE, AND SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF PEER-JUDGMENT SCORES OF BOYS AND GIRLS OF FIVE FIFTH-GRADE CLASSES

	Girls			Boys			Means		Variances	
Room	N	Mean	Variance	N	Mean	Variance	U*	P	F	P
A	16	40.19	69.40	15	40.93	357.13	103.5	N.S.	5.17	.005
B	19	39.21	155.11	11	45.54	838.06	91.0	N.S.	5.63	.005
C	14	46.07	227.35	20	35.50	115.95	84.5	N.S.	2.01	.10
D	12	33.58	164.08	18	45.83	592.92	140.0	N.S.	3.51	.05
E	10	42.60	199.84	18	38.94	138.50	78.5	N.S.	1.39	.10

* The Mann-Whitney U test was employed.

TABLE 5

SEX COMPOSITION OF UPPER AND LOWER HALVES* OF CLASS ACCORDING TO TEACHER JUDGMENT OF CURIOSITY; CHI SQUARE AND LEVEL OF SIGNIFICANCE IN FIVE FIFTH-GRADE CLASSES

Room	Upper Half		Lower Half		Chi Square	Level of Significance
	Boys	Girls	Boys	Girls		
A	7	9	8	8	.13	.75 > P > .50
B	7	8	4	11	.57	.50 > P > .25
C	12	5	9	9	.81	.50 > P > .25
D	11	5	7	9	1.14	.25 > P > .10
E	11	3	7	8	1.92	.25 > P > .10

* Where the number in the class is odd, the person in the middle is counted with the lower group.

TABLE 6

PRODUCT-MOMENT CORRELATION COEFFICIENTS BETWEEN THE CURIOSITY AND INTELLIGENCE* OF PUPILS IN FIVE FIFTH-GRADE CLASSES

Room	Teacher Judgment of Curiosity and I.Q.		Peer-Judgment of Curiosity and I.Q.	
	N	r	N	r
A	31	.67	30	.33
B	28	.60	28	.65
C	30	.51	30	.32
D	30	.43	30	.32
E	29	.57	28	.63

* Intelligence quotients based on Lorge-Thorndike Intelligence Test.

Establishing Criterion Groups

The method used in the second preliminary study and in the major study to control for intelligence was established as a result of work carried out in connection with the first preliminary study. Criterion groups selected in the first preliminary study were based on deviations from regression lines. Criterion groups selected in later studies were obtained by a matching process.

Criterion groups in first preliminary study. -- In order to obtain groups of pupils of high and low curiosity independent of intelligence in the first preliminary study, lines of regression of curiosity on intelligence were drawn for each class. Pupils whose scores were at lease one-half standard error of estimate above the regression line were included in a high-curiosity group; those whose scores were at least one-half standard error of estimate below were included in a low-curiosity group. This was done separately for teacher and peer judgment. Tables 7 and 8 show the regression equations, standard errors of estimate and correlation coefficients for five classes in the preliminary study.

The two high-curiosity and the two low-curiosity groups established from the two different judgments were then compared. Only pupils who were placed similarly by the two judgments were retained in the criterion groups. Table 9 shows the number of children whose curiosity as judged by their teachers and peers deviated by at least one-half standard error from the line of regression of curiosity on intelligence.

The five regression equations based upon teacher judgment of curiosity were not significantly different from each other; those based upon peer judgment were significantly different. In the latter case, a regression equation was written for the five classes as one group. The high- and low-curiosity groups yielded by the use of this equation did not differ from those established by the use of the five separate equations.

Table 9 shows that there were fifteen children who were judged by both teachers and peers to exhibit more curiosity than would be predicted on the basis of their intelligence quotients. There were also twenty children who were judged by both teachers and peers to exhibit less curiosity than would be expected on the basis of their intelligence quotients. These children formed the criterion groups of the first preliminary study.

It seemed pertinent to examine with the criterion groups the same factors studied with the total groups before intelligence was controlled. Table 10 shows that the means and variances of age, popularity, and intelligence of the high- and low-criterion groups do not differ significantly.

Questions were also raised regarding race and sex bias as they affected the criterion groups. The limited number of Negroes made it

TABLE 7

EQUATIONS FOR THE LINES OF REGRESSION OF TEACHERS' JUDGMENT OF CURIOSITY AND LORGE-THORNDIKE INTELLIGENCE QUOTIENTS, STANDARD ERRORS OF ESTIMATE AND CORRELATION COEFFICIENTS FOR FIVE FIFTH-GRADE CLASSES IN THE FIRST PRELIMINARY STUDY

Room	N	r	Standard Error of Estimate	Regression Equation
A	31	.67	6.62	$Y' = .46X - 30.69$
B	28	.60	6.46	$Y' = .53X - 48.04$
C	30	.51	7.48	$Y' = .49X - 31.05$
D	30	.43	8.40	$Y' = .39X - 29.52$
E	29	.57	6.89	$Y' = .35X - 17.20$

TABLE 8

EQUATIONS FOR THE LINES OF REGRESSION OF PEERS' JUDGMENT OF CURIOSITY AND LORGE-THORNDIKE INTELLIGENCE QUOTIENTS, STANDARD ERRORS OF ESTIMATE AND CORRELATION COEFFICIENTS FOR FIVE FIFTH-GRADE CLASSES IN THE FIRST PRELIMINARY STUDY

Room	N	r	Standard Error of Estimate	Regression Equation
A	30	.33	13.74	$Y' = .36\ X + 4.21$
B	28	.65	16.09	$Y' = 1.52\ X - 138.67$
C	30	.32	13.34	$Y' = .49\ X - 6.09$
D	30	.32	20.12	$Y' = .63\ X - 33.36$
E	28	.63	9.98	$Y' = .60\ X - 15.36$

TABLE 9

NUMBER OF CHILDREN WHOSE CURIOSITY AS JUDGED BY THEIR TEACHERS AND PEERS DEVIATED BY AT LEAST ONE-HALF STANDARD ERROR FROM THE LINE OF REGRESSION OF CURIOSITY ON INTELLIGENCE

Room	Teacher		Peer		Teacher and Peer	
	Higher	Lower	Higher	Lower	Higher	Lower
A	9	11	7	11	4	5
B	11	8	7	10	4	4
C	7	9	7	7	2	2
D	8	9	4	8	1	4
E	11	9	9	10	4	5
TOTAL	46	46	34	46	15	20

impossible to reach definite conclusions. Two Negroes were included in the criterion groups--one in the high-curiosity group and one in the low. Ten boys and five girls were in the high-curiosity group; seven boys and thirteen girls were in the low group. When tested, this was found to be a chance arrangement.

Finally, the self-judgments of the children in the criterion groups were examined. On the whole, children in the high-curiosity group gave themselves higher scores on curiosity than did children in the low-curiosity group. As shown in Table 11, the difference between the means was significant at the .005 level while the difference between the variances did not reach the .20 level. It was this information regarding the self-judgment test that prompted a reconsideration of the procedure used to establish criterion groups. Groups were selected in the second preliminary and major studies in such a way that self judgment as well as teacher and peer judgments were used.

Criterion groups in the second preliminary study. -- In order to utilize the information from teacher judgment, peer judgment, and self judgment, a composite score was obtained. Groups of pupils with different levels of curiosity were identified by matching children with high composite scores with children with low composite scores on the basis of verbal IQ, nonverbal IQ, and age.

Since teacher judgment was based on a ranking procedure, scores on peer judgment and self judgment were converted likewise to ranks. The ranks the three judges had assigned to each pupil were summed. The sum of ranks was the pupil's composite score. The composite scores for each class were rank ordered.

TABLE 10

COMPARISON OF HIGH- AND LOW-CURIOSITY GROUPS AS TO AGE, POPULARITY, AND INTELLIGENCE

Item	N	Age		Popularity*		Intelligence	
		Mean	Variance	Mean	Variance	Mean	Variance
Higher	15	130.33	47.69	93.5	523.18	105.07	281.00
Lower	20	128.30	38.61	104.9	449.09	105.60	279.14
		$t = .91$	$F = 1.26$	$t = 1.47$	$F = 1.19$	$t = .09$	$F = 1.03$
Significance of Difference		$P > .30$	$P > .20$	$P > .10$	$P > .20$	$P > .90$	$P > .20$

* Lower Score = Higher Social Acceptance

TABLE 11

MEAN AND VARIANCE OF HIGH- AND LOW-CURIOSITY GROUPS ON A SELF-APPRAISAL OF CURIOSITY AND SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS AND BETWEEN VARIANCES

Item	N	Mean	Variance
Higher Curiosity	15	73.53	93.98
Lower Curiosity	20	62.55	131.92
		t=2.87	F=1.28
Level of Significance		P <.005*	P >.20

*One-tail test

Each class, in the second preliminary study, was divided into halves and thirds. In actual practice, it was not possible to be precise in this division. In some cases, the class was composed of an uneven number of pupils; in other cases, the number of similar ranks clustered around the dividing line made the upper and lower groups uneven. It was, therefore, necessary to eliminate those pupils judged to be the least representative of their group. This usually meant eliminating children on or near the cutting line between the groups.

Once the upper and lower halves and upper, middle, and lower thirds were identified in each classroom, children in one group were matched on the variables stated above with children in the opposite group regardless of classroom membership. In other words, a child in the high curiosity group in Room A might be matched on the basis of verbal IQ, nonverbal IQ, and age with a child in Room D.

By this process, 51 high-curiosity children and 51 low-curiosity children were selected to form the criterion groups from upper and lower halves. When upper and lower thirds were used, the criterion groups consisted of 31 pupils. Table 12 shows the number, mean age, and mean Lorge-Thorndike Verbal and Nonverbal IQ's for pupils making up the criterion groups in the second preliminary study.

Although no effort was made to control for sex in the second preliminary, an examination of the criterion groups selected showed very little imbalance. In the upper and lower thirds, there were 21 boys and 10 girls in the high-curiosity group and 17 boys and 14 girls in the low-curiosity group. In the upper and lower halves, there were 32 boys and 19 girls in the high-curiosity group and 22 boys and 29 girls in the low-curiosity group. When tested, using the chi-square technique, these differences were found to be insignificant. Since later findings indicated that there were significant differences between the sexes on some of the tests designed to measure curiosity,

TABLE 12

NUMBER, MEAN AGE, AND MEAN LORGE-THORNDIKE VERBAL AND NONVERBAL IQ'S FOR UPPER- AND LOWER-CURIOSITY GROUPS SELECTED IN THE SECOND PRELIMINARY STUDY

Curiosity Group	N	Mean Age in Months	Mean Verbal IQ	Mean Nonverbal IQ
Upper Half	51	128.92	103.71	100.61
Lower Half	51	127.42	103.80	100.24
Upper Third	31	129.03	103.29	101.71
Lower Third	31	129.54	103.32	99.97

it was decided, in spite of the results of the chi-square test mentioned above, to control the sex variable more rigorously in the major study.

Criterion groups in the major study. -- Criterion groups were obtained in the major study in approximately the same manner as criterion groups were established in the second preliminary study. In addition to verbal IQ, nonverbal IQ, and age, children were also matched on sex. Table 13 shows the number, mean age, and mean verbal and nonverbal IQ's for pupils making up the criterion groups in the major study. In the upper and lower halves, there were 115 boys and 114 girls. In the upper and lower thirds, there were 62 boys and 62 girls.

TABLE 13

NUMBER, MEAN AGE, AND MEAN LORGE-THORNDIKE VERBAL AND NONVERBAL IQ'S FOR UPPER- AND LOWER-CURIOSITY GROUPS IN THE MAJOR STUDY

Curiosity Group	N	Mean Age in Months	Mean Verbal IQ	Mean Nonverbal IQ
Upper Half	229	130.72	115.30	110.05
Lower Half	229	130.93	115.57	110.54
Upper Third	124	130.30	115.73	110.99
Lower Third	124	130.98	115.76	111.01

The mean IQ's of the children in the major study were considerably higher than those of the children in the two preliminary studies. The first two studies were based on samples drawn from school districts specifically selected because their pupils were considered fairly representative of elementary school children generally. The sample used in the major study was drawn from a suburban area where the ratio of highly-skilled persons to the total population is large because scientific personnel associated with major chemical industries and many of the faculty of the state university reside there.

Summary

In order to validate instruments designed to measure curiosity, it was necessary to identify groups of children possessing different amounts of this characteristic. To do this, curiosity itself, as it pertained to school children had to be clearly defined. Since no definition of curiosity in such terms existed, one was written by gathering information from several sources. These included an informal survey, a formal study of college sophomores, a review of dictionary terms, a study of the history of the word, and a review of the literature.

From the data thus obtained, a school child was said to exhibit curiosity to the extent that he:

1. reacts positively to new, strange, incongruous, or mysterious elements in his environment by moving toward them, by exploring them, or by manipulating them;
2. exhibits a need or a desire to know more about himself and/or his environment;
3. scans his surroundings seeking new experiences;
4. persists in examining and exploring stimuli in order to know more about them.

The teachers and peers were asked to rate each member of the class as to the extent to which the characteristics were exhibited. The teachers simply ranked their pupils in a prescribed manner. The peers tried to identify classmates who were most nearly like characters described as being needed to play the parts in a pseudo play. In addition, each pupil was asked to rate himself on a self-rating inventory.

It was assumed that several variables might influence the judgments of teachers and peers. Among such variables were age, race, popularity, sex, and intelligence. There were insufficient children of minority races available to test the assumption regarding race; age was automatically controlled to some extent because the study was confined to the fifth grade; popularity and sex did not seem to unduly influence judgments; intelligence, however, tended to be of considerable influence. Therefore, in determining criterion groups, intelligence was controlled in both preliminary studies and in the major study. In the major study, it was also deemed desirable to control for sex.

Criterion groups in the first preliminary study were developed by using regression equations based on correlations between teacher judgment and intelligence and between peer judgment and intelligence. Since self judgment was eliminated in this process, in the last two studies all three judgments were combined into a composite judgment. The criterion groups of the second pilot study were selected by matching children in high groups with children in low groups on age, verbal IQ, and nonverbal IQ. In addition, in the major study, the sexes were equally represented in the criterion groups.

The mean IQ's of children composing the preliminary studies corresponded closely with children generally. The children in the major study had mean IQ's that were somewhat higher. These criterion groups were used to judge the instruments designed to measure curiosity.

Chapter IV

Measuring Instruments: Development and Evaluation

In order to explore the feasibility of measuring curiosity of elementary school children with paper-and-pencil instruments, a number of kinds of items were developed and combined into group tests. The instruments were devised to measure aspects of behavior, attitudes, and mental functioning that logically seemed to be related to curiosity.

The instruments that were developed were tried out in three periods during the academic years of 1959-1960 and 1960-1961. At the end of the first and second periods unsatisfactory instruments were either abandoned or revised. New instruments were also developed.

At the termination of each testing period, the scores for the various instruments were analyzed for sex differences and for differences between criterion groups.

First Preliminary Study

The testing for the first preliminary study was carried out in the New Castle Special School District, New Castle, Delaware, with six classes of fifth-grade children participating. Thirteen different kinds of items were used. They are described in the following nine categories:

1. Picture- and Story-Satisfaction Items ✓
2. Preferred Behavior Items ✓
3. Hidden Picture Items ✓
4. Breadth-of-Information Items ✓
5. Memory-for-Incomplete-Story Items ✓
6. Attitude-toward-Curiosity Items
7. Preference-for-the-Unbalanced-and/or-Unfamiliar Items ✓
8. Maze Items
9. Satisfaction-with-Evidence Items.

Which - Saying-do-you Believe - Test   Riddle - Path - Puzzle Items

Picture- and story-satisfaction items. -- It is commonly believed that the child who asks many questions is high in curiosity. Other studies have found sex differences in number of questions asked, but none has attempted to see if there is a relationship between number of questions asked and amount of curiosity exhibited.

In the first preliminary study, two types of material were employed to elicit questions from the children. In one case the children were given short stories of less than one hundred words each, and were asked: "Did you like this story? Why did you like or not like this story? What else would you like to know about this story?" In the other case, the children were shown pictures of unfamiliar animals or objects and were given one piece of information about the picture. They were then asked: "What else would you like to know about this picture?" A record was kept of the amount of time each child spent in writing questions.

The stories were presented to the children in a set of six. (See Appendix B .) It was at once apparent that too many had been presented at one time and too many questions had been asked following each story. Some children wrote at length telling why they did or did not like the stories and wrote very few questions. Consequently, another set (see Appendix B) consisting of only two stories was later presented to the children. The number of questions asked increased on the average by one hundred per cent. The pictures were also presented in two sets. The first set consisted of five pictures, the second of two.

When the differences in time spent and differences in total number of questions asked by the children of the upper and lower curiosity groups were tested for significance, no significant differences were found. A qualitative score for questions asked was then derived by counting only the number of independent ideas expressed in the questions. For example, in asking about the train story, if a child had written: "Did anyone die? How many people died?", he would be credited with one idea. "What happened to the signal lights?" and "Did the train reach the station on time?" would be credited as two ideas. It was found that for all but the first set of stories, differences in qualitative scores were in favor of the higher curiosity group although not significantly so. As Table 14 shows, there were no significant differences between the curiosity groups in the number of questions asked nor in number of independent ideas expressed in questions. Although the differences did not reach significance, it was decided to continue to explore the use of questions as a means of distinguishing between curiosity groups in the second preliminary study.

The number of questions written by girls tended to be greater than the number of questions written by boys. The girls also tended to rate higher in number of independent ideas expressed in the questions. Table 15 shows the number, mean, variance, t, and level of significance for the sets of pictures and stories used in the first preliminary study. Since number of questions asked yielded several decidedly skewed distributions as would logically be expected, and since F tests of the differences between variances for the scores of the two sexes yielded one significant F, the data of Table 15 were also tested by chi square for significance of difference in the numbers of boys and girls above and below the median for each variable. All chi squares were significant beyond the .05 level excepting those for the first set of stories, both of which failed to reach the .05 level of significance.

TABLE 14

MEAN, VARIANCE, AND RESULT OF TEST OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCES FOR STORY AND PICTURE SATISFACTION TESTS FOR CURIOSITY GROUPS IN THE FIRST PRELIMINARY STUDY

Test	Higher Curiosity Group		Lower Curiosity Group		F	t
	Mean	Variance	Mean	Variance		
Stories I						
No. of Questions	5.75	9.85	7.63	40.11	3.98	.73
No. of Ideas	5.42	8.91	6.69	26.84	2.95	.91
Stories II						
No. of Questions	14.92	41.92	16.32	73.16	1.73	.49
No. of Ideas	12.08	20.22	10.74	25.98	1.25	.74
Pictures I						
No. of Questions	18.33	83.69	19.05	127.42	1.50	.19
No. of Ideas	15.33	45.02	14.53	61.41	1.34	.31
Pictures II						
No. of Questions	19.85	120.75	19.85	100.63	1.23	---
No. of Ideas	14.69	55.75	12.40	38.94	1.47	.95

TABLE 15

NUMBER, MEAN, VARIANCE, AND t FOR THE DIFFERENCE BETWEEN MEAN NUMBER OF QUESTIONS ASKED BY GIRLS AND BOYS ABOUT PICTURES AND STORIES

	BOYS			GIRLS			
	N	Mean	Variance	N	Mean	Variance	t
Stories I							
No. of Questions	96	6.71	33.27	81	7.78	27.45	1.24
No. of Ideas		5.70	17.00		6.91	18.18	1.90
Stories II							
No. of Questions	92	12.34	52.55	83	16.17	56.38	3.45*
No. of Ideas		10.38	32.84		13.36	36.57	3.33*
Pictures I							
No. of Questions	98	14.61	43.01	83	19.84	91.36	4.32*
No. of Ideas		13.08	32.48		16.86	52.46	3.90*
Pictures II							
No. of Questions	97	14.97	66.65	87	22.07	85.83	5.68*
No. of Ideas		10.84	34.30		16.26	43.21	5.89*

*Significant at or beyond the .05 level

The children's responses to the questions of whether they liked the stories and as to why they liked or did not like the stories were studied both for differences between curiosity groups and for differences between the sexes. No significant differences were found and no trends were discerned.

Preferred-behavior items. -- It was hypothesized that children high in curiosity would prefer to participate in behavior that was different from the behavior preferred by children low in curiosity. In order to test this hypothesis, a series of multiple-choice items was constructed which for each item allowed the children to choose one from among four options concerning what they would do, would like to do, or would like to become. After the test was assembled, it was submitted to four judges who selected for each item the option which in their separate opinions indicated the most curiosity. In some cases, the judges ordered the options according to their relative standing in indicating curiosity. Items on which there was disagreement were either discarded or rewritten so that agreement of judges was obtained.

The test was named What Would You Do and consisted of fifty items. The following is an example of the type of item used:

If something you did not understand were mentioned in class, would you
_____go to the encyclopedia and look it up?
_____wait for someone else to report on it?
_____let it go until it came up again?
_____hope the teacher would clear it up?

A copy of the complete test is included in Appendix B .

The distribution of scores appeared approximately normal and the difference between variances of the scores of the curiosity groups was insignificant. Therefore, the difference between the means of the scores made by the high- and low-curiosity groups was tested by the t test of the diffence between independent sample means. For these data, the t was found to be 1.81 with a p less than .05 for a one-tail test. This would indicate that the What Would You Do test has possibilities in discriminating between curiosity groups with high-curiosity children on the average making the higher scores on the test.

The mean of the scores of the boys was higher than the mean of the scores of the girls. This difference was also tested by the t test, and with a t of 1.95 was found to be significant at the .05 level.

Hidden-picture items. -- One aspect of the definition of curiosity used in this study is stated as follows: ". . . an elementary school child exhibits curiosity to the extent that he persists in examining and exploring stimuli in order to know more about them." In order to test this part of the definition, the services of an artist were engaged to produce a series of pictures in which the pupils could find the answers to questions if they would search long enough. A couple of examples will reveal the nature of the items. In one picture there is a jungle scene with a number of animals so drawn that they blend with their surroundings and are not easy to see. The children are asked to find how many animals some fictional characters saw on their trip through the jungle. Accompanying another picture, there is a short story about a boy who had visited a far-away land. The children are told to study the picture for a clue as to the name of the country the boy visited. The picture contains palm trees and in a very unobtrusive spot there is a pyramid which should let the children know that the answer to the question is Egypt. Copies of the pictures are included in Appendix B.

The papers were scored by giving a credit of one point for each object or animal that was circled correctly and subtracting one point for each that was circled incorrectly.

The mean of the scores of the higher curiosity group exceeded the mean of the lower curiosity group. The difference between the means was significant beyond the .05 level using a one-tailed test. For these scores, F was 1.36 with a corresponding p of more than .20; t was 1.72, with a p of less than .05.

The difference between the means of the scores of the boys and girls was in favor of the boys and was a significant difference. The difference between variences was not significant. The F for these scores was 1.06; the t was 2.38 with a corresponding p of less than .02.

A record was kept of the length of time each child spent in looking for the objects or animals in the pictures. When the data were studied, no significant differences were found between curiosity groups nor between sexes.

Breadth-of-information items. -- The use of general-information items is based upon the assumption that one who is curious about his environment will have gathered a larger store of general knowledge than will one who is not curious, although the tested intelligence of the two may be the same.

The items for the general-information test, called the "What Do You Know" test, were written on topics selected at random from the World Book Encyclopedia. Compton's Encyclopedia, Collier's Encyclopedia, and Junior Britannica were then checked to see if the information necessary for the correct answer to each item were contained in each. Items that did not appear in all four encyclopedias were eliminated.

The test as it was administered in the first preliminary study consisted of forty-one multiple-choice items. (See Appendix B.) The following item is typical of those used in the test:

Kremlin is
_____the fortified part of a Russian city.
_____the place where the American Congress meets.

_____a stiff material to make skirts stand out.
_____a book of fairy stories.

When the papers were collected, the children were told that the correct answers to the test items could be found in an encyclopedia. It was thought that with this information some more curious children might look up the answers to some of the questions.

The scores of the children in the higher- and lower-curiosity groups were studied. The mean of the higher-curiosity group's scores exceeded the mean of the lower-curiosity group's. The t was 1.74; the associated p, less than .05 using the one-tail test. The difference between the variances for the two groups was found to be insignificant.

The scores of the boys and girls differed very slightly in means and variances. For the test of the significance of the difference between means, the t was .59; for the test of the significance of difference between variances, F was 1.30. The p associated with the former is greater than .50; with the latter, greater than .20. This test revealed no sex difference in amount of general information.

The test was readministered after one week. One hundred sixty-four children took the test both times. An estimation of reliability of .77 for the test was obtained by the test-retest method. From the first to the second administration, the group made a mean gain of .60 points. The variability of the scores did not change significantly. No difference in mean gains was found between curiosity groups.

Memory-for-incomplete-story items. -- It was thought that children who are higher in curiosity might give closer attention to stimuli such as stories and therefore might have better immediate memory for facts from stories than would children of lower curiosity. To test this hypothesis, twelve short stories were written and assembled into a test called "Do You Want To Know More." Six of these stories were unfinished and six were finished. At the end of each story was the question: "Would you like to know more about this story?" The question was followed by the words "yes" and "no." The directions to the children were: "Read the following stories and then indicate whether you would like to know more about each story."

After the stories had been read aloud by the examiner and the children had marked their answers, the papers were collected and a test of forty-eight multiple-choice items about the stories was distributed. The items were evenly divided among the twelve stories. The test was called "What Do You Remember?" Both the set of stories and the questions are included in Appendix B.

The difference between the means of the higher and lower curiosity groups on the "What Do You Remember" test was in favor of the higher curiosity group, but was not a significant one. For the test of the difference between variances, F was 1.53, the corresponding p was greater than .20. For the test of the significance of the difference between means, t was .44, the corresponding p greater than .60. The hypothesis that the children of higher curiosity would remember more of the facts given in the stories was not supported.

The difference between the means of boys and girls on the What Do You Remember test was in favor of the boys, but was not significant. The F test for these data yielded an F of 1.29 with a corresponding p greater than .20; the t test yielded a t of .52, with a p greater than .50.

The difference between number of children in higher and lower curiosity groups who wanted to know more about finished or unfinished stories was tested by the chi-square technique. Preference for hearing more about finished stories than about unfinished stories was independent of curiosity group. A similar test revealed no association between preference for finished stories and sex.

Attitude-toward-curiosity items. -- It was assumed that if a child feels comfortable about being curious, he will be more likely to sustain his curiosity. If, on the other hand, he feels guilty about it, he will be more likely to suspend or curtail his curiosity. It was expected, then, that children in the higher curiosity group would have more positive attitudes toward curiosity than would children of the lower curiosity group.

An instrument of forty items was devised and was called the What I Think test. The directions to the children were: "The statements below tell what some person did or what he or she usually does. There are no right or wrong answers. Mark the answer that tells what you think of it. The best answer is the one that tells what you think. Items such as the following were used:

Peter picks up strange things and examines them.
Very Good _____ Good _____ Neither Good Nor Bad _____ Bad _____ Very Bad _____

Jerry does not ask questions; he waits for people to tell him what they want him to know.
Very Good _____ Good _____ Neither Good Nor Bad _____ Bad _____ Very Bad _____

The answers were scored so that acceptance of exploratory and information-seeking behavior resulted in a high score.

The difference between the means of the high and low curiosity groups on the What I Think test was small. A test of the significance of the difference between the means yielded a t of .12 which has a corresponding p of greater than .50. The hypothesis that children of higher curiosity have positive attitudes toward exploratory and information-seeking behavior was not supported by the results of the What I Think test.

The mean of the boys' scores was higher than the mean of the girls' scores. When the difference was tested for significance, the t was found to be 3.95 with a p of less than .01. The difference in variability between boys' and girls' scores was significant with the girls' scores being more variable. The F was 2.46 with a corresponding p of less than .01. Because of the significant difference in variability, the difference between the scores of the boys and girls was tested by the median test. Chi square was 3.83; the corresponding p was .05. From this it would seem that boys have more favorable attitudes toward exploratory and information-seeking behavior than do girls.

Preference-for-the-unbalanced-and/or-unfamiliar items. -- If moving toward new, strange, incongruous elements in the environment is a manifestation of curiosity, then it may be logical to assume that children with a high degree of curiosity are those who willingly move out from the familiar and the secure and seek to establish contact with aspects of the environment that present novelty or some disequilibrium. Conversely, it might be concluded that children of low curiosity tend to seek more balanced and familiar environments and exhibit little or no desire to extend the boundaries of their life spaces. It was, therefore, hypothesized that children with high curiosity would select experiences related to an unbalanced or unfamiliar environment more frequently than would children of low curiosity.

Four instruments were developed to test this hypothesis. One called the Which to Discuss test consists of twenty pairs of geometric figures and symbols. In each pair, one is more balanced and/or more familiar than the other. The directions to the children are as follows: "You are told that there is a story about each figure in the pairs below. If you could hear only one story for each pair, which would you select? Draw a circle around the one in each pair you would want discussed."

In scoring, the unbalanced or unfamiliar was scored one; the balanced or familiar was given no credit.

The coefficient of internal consistency calculated by the Kuder-Richardson formula for estimating reliability was .91. The items of the test were of approximately equal difficulty for these children. The distribution of scores was bimodal.

The difference between the variances of the scores of the children of the higher and lower curiosity groups was not significant at the .05 level when tested by the F ratio. The difference between means for the same groups was tested by both the t and the Mann-Whitney U test. For the former, t was 3.22 and the corresponding p was .005; for the latter, U was 73.5 and the corresponding p was .016. When the items of the test were studied, every item was found to discriminate in favor of the higher-curiosity group. The results of the Which to Discuss test support the hypothesis that children of high curiosity tend to select the unbalanced and unfamiliar more frequently than do children of low curiosity.

The difference between the means of the scores of boys and girls on the "Which to Discuss" test was in favor of the girls but not significantly so. For the test of the difference between means, t was .41, and the corresponding p was greater than .70. The difference in variability between the scores of the boys and girls was slight and insignificant, the F ratio being 1.06.

A second test, similar to the "Which to Discuss" test in that it consists of twenty geometric figures and symbols, was developed and called "Which is More Pleasing." The directions given to the children were: "Some people think some figures are more pleasing than others. Please look at the following pairs of figures and draw a circle around the one of each pair that you think is more pleasing to look at." The more irregular, unstructured, unbalanced, and/or unfamiliar symbol of each pair was given a score of one; the other symbol was scored zero.

No significant differences between sexes or between curiosity groups were revealed by this test. Since it seems to be testing aesthetic taste, the results are not surprising.

A third test related to the two just discussed was developed to test the hypothesis that children of high curiosity are more accepting of the unfamiliar and unusual than are children of low curiosity. The test consists of twenty-five pairs of proverbs or sayings and is called "Which Saying Do You Believe."

The directions to the pupils are as follows: "All of you know what proverbs are. Many people have used them. Benjamin Franklin wrote some in 'Poor Richard's Almanac.' If you read proverbs, however, you find that some say things that are opposite to what others say. Below are listed pairs of proverbs. Please mark the one of each pair which you believe is more nearly true most of the time." The following are examples of the items used in the test:

It is better to be safe than sorry.
Nothing venture, nothing have.

A bird in the hand is worth two in the bush.
Never do things by halves.

In each pair, the saying which indicated a willingness to try something new or to take a chance was given a score of one; the other item of each pair was scored zero.

The mean of the scores of the higher-curiosity group exceeded the mean of the scores of the lower-curiosity group. The difference between the means was significant at less than the .025 level by the one-tail test. The t was 2.24 for these data; the F was 1.31 with a p of greater than .20.

The difference between means of boys' and girls' scores was in favor of the girls, but was small. It was found to be insignificant by the t test. The t was .62, the corresponding p greater than .50; the F was 1.13, with p greater than .20.

The estimate of reliability for "Which Saying Do You Believe" was .70 by the split-half method of determining internal consistency.

A fourth test of the hypothesis consisted of five messages in code. In each code some of the letters were from the Roman alphabet, some were the Roman letters in odd positions, and some were adaptations of an ancient Ethiopian alphabet.

The instructions to the children were as follows: "Let us pretend that you found the following secret messages. You will have to solve each message separately. It is probably better to work on one sign at a time. As you look at each code, you will see some signs that interest you more than others. Please draw circles around five signs in each message which interest you more than others.

In scoring, the choice of a letter of the Roman alphabet was given no credit, choice of a letter of the Roman alphabet in an odd position was given two points, choice of a letter of the ancient Ethiopian alphabet was given three points.

The difference between the variances of the scores of the higher and lower curiosity groups was not significant at the .05 level, F was 2.79, the corresponding p was between .10 and .05. The higher curiosity group had the more variable scores. For the test of the difference between means, t was .69, the corresponding p equal to .50.

The mean of the girls' scores exceeded the mean of the boys' scores, but not significantly. The boys' scores were significantly more variable than the girls' scores. The F was found to be 1.97 which is significant at the .02 level.

Although the children were not asked to solve the code and read the messages, there were a few children in each classroom who read one or more messages voluntarily.

Of the four tests developed to test the hypothesis that children of higher curiosity are more accepting of the unbalanced and unfamiliar than are children of low curiosity, two discriminated between curiosity groups at an acceptable level of significance. On all of the tests there was a small and statistically insignificant difference in favor of the girls. This trend is worth mentioning here only because of its consistency.

Maze-test items. -- Persistence in seeking information is considered to be an element of curiosity. To examine this aspect of the definition, maze-test items were developed to test the hypothesis that children of high curiosity would be more persistent in solving them than would children of lower curiosity.

The maze items were so drawn that the pupil had to solve the maze in order to find the answer to a question. The test was very well liked by the children, but was probably too easy to use with fifth-grade children. In some classes, more than half of the children made perfect scores. The difference between the means of the higher and lower curiosity groups was one one-hundredth of a score point.

Although the test failed to discriminate between curiosity groups, it did reveal a significant difference between boys' and girls' scores. The scores of the girls' were more variable, but the difference was not significant at the .05 level. The F ratio was 1.40; the corresponding p greater than .05. The mean of the boys' scores exceeded the mean of the girls' scores by 1.80 score points. For the test of the difference between the means, t was 2.95 and the corresponding p was less than .01.

The test, called "Path Puzzles" was administered in two parts because of the time necessary for the children to complete it. A copy of the test is included in Appendix B.

Satisfaction-with-evidence items. -- It was thought that children who are high in curiosity would be less likely than children who are low in curiosity to be satisfied with guessing or estimating the answers to questions. A test called "Which One" was devised to test this hypothesis. The test consists of four familiar optical illusions, and in each case the task is to decide which straight line, curve, or circle is larger than the other.

Item one consists of two straight lines, A and B, of equal length, with A being perpendicular to B at the midpoint. Beneath the lines are three options and one question as follows:

_____Line A is longer than line B.
_____Line B is longer than line A.
_____Both lines are of the same length.

Why do you think so?

The other three items are very similar to item one. The instructions to the children are: "For each of the following, mark the answer which tells what you think. Then tell why you think as you do."

In scoring, a child was given credit for an tiem only if some effort had been made to actually compare the sizes of the lines or circles by measuring with ruler, pencil, paper, or some other means. It was found that few children attempted to measure the lines. Most were apparently willing to accept the testimony of their own eyes.

A count was made to determine how many of the children in the higher curiosity group and lower curiosity group had measured and how many had not measured. A chi square test applied to the data resulted in a chi square of .28 with a corresponding p of greater than .50. The proportion of children in the higher curiosity group who measured was not significantly greater than the proportion in the lower curiosity group who measured.

A similar chi-square test revealed no significant difference between the sexes in the proportion of children who measured. Twenty-five out of seventy-nine girls measured; twenty-five out of ninety-five boys measured. The chi square for these data was .37 with a corresponding p of greater than .50.

Summary of findings of first preliminary study. -- In the first preliminary study thirteen different kinds of items calculated to measure aspects of behavior and attitudes that seemed logically to be related to curiosity were administered to six classes of fifth-grade children. In some cases, more than one kind of item was intended to test a particular hypothesis concerning curiosity.

Table 16 shows the means, variances, and results of tests of significance of differences between means and variances for the higher- and lower-curiosity groups. The higher- and lower-curiosity groups consisted of fifteen and twenty children, respectively. In a few cases, one or two children from the criterion groups were available for testing neither when the test was first administered nor when time for retesting could be scheduled. Since in no case was the resulting loss in degrees of freedom large enough to change the interpretation of results from what they would have been had all the children been represented, N's are not included in the table.

The difference between the means of the curiosity groups was significant at the .05 level or better on five of the experimental tests: What Would You Do, Hidden Pictures, What Do You Know, Which to Discuss, and Which Saying Do You Believe. These five tests were given priority in scheduling for the second preliminary study since they looked to be the most promising in distinguishing between children of high and low curiosity.

Five tests -- What Would You Do, Hidden Pictures, What I Think, Path Puzzles, and Story and Picture Satisfaction brought out significant differences between the sexes. On each of the first four tests, shown in Table 17, the mean of the boys' scores exceeded the mean of the girls' scores; on the last, discussed earlier, the mean of the girls' scores exceeded the mean of the boys' scores. These tests also were deemed worthy of further study.

The tests used in the first preliminary study were subjected to item analysis, and in some cases were thoroughly revised before being used in the second study.

Second Preliminary Study

The second preliminary study involved seven fifth-grade classes in the New Castle Special School District, New Castle, Delaware. The following ten types of instruments were used:

1. Picture-and Story-Satisfaction Items
2. Preferred-Behavior Items

TABLE 16

MEAN, VARIANCE, AND RESULT OF TEST OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCE FOR HIGHER- AND LOWER-CURIOSITY GROUPS FOR TEN EXPERIMENTAL TESTS ADMINISTERED IN THE FIRST PRELIMINARY STUDY

Name of Test	Higher Curiosity Group		Lower Curiosity Group		F	t
	Mean	Variance	Mean	Variance		
What Would You Do[1]	118.64	262.78	104.82	512.03	1.88	1.81*
Hidden Pictures	23.92	59.30	19.37	44.86	1.36	1.72*
What Do You Know	17.87	13.58	15.45	16.99	1.23	1.74*
What Do You Remember	34.33	65.02	33.17	43.14	1.53	.44
What I Think	49.21	105.60	48.74	127.54	1.18	.12
Which To Discuss[1]	15.60	16.65	9.22	41.09	2.44*	3.22*
Which is More Pleasing	9.50	5.58	9.50	10.15	1.75	---
Which Saying Do You Believe	13.60	5.85	11.89	3.57	1.66	2.24*
Which To Solve	63.42	284.74	67.12	104.23	2.79*	.69
Path Puzzles	18.69	14.52	18.71	13.22	1.12	---

*Significant at or beyond the .05 level.

[1] By the Mann-Whitney U Test, level of significance was less than .05 for What Would You Do and less than .02 for Which to Discuss.

TABLE 17

NUMBER, MEAN, VARIANCE, AND RESULT OF TEST OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCE FOR BOYS AND GIRLS FOR TEN EXPERIMENTAL TESTS ADMINISTERED IN THE FIRST PRELIMINARY STUDY

Name of Test	BOYS			GIRLS				
	N	Mean	Variance	N	Mean	Variance	F	t
What Would You Do	93	118.92	768.03	84	111.14	619.84	1.24	1.97*
Hidden Pictures	89	19.18	83.38	73	15.70	88.30	1.06	2.38*
What Do You Know	93	15.74	20.78	77	15.30	26.98	1.30	.59
What Do You Remember	95	33.05	48.75	79	32.52	37.84	1.29	.52
What I Think	98	52.38	59.32	84	46.54	146.03	2.46*	3.95**
Which To Discuss	95	11.83	34.61	80	12.20	36.79	1.06	.41
Which is More Pleasing	96	9.00	9.58	86	8.53	7.62	1.26	1.08
Which Saying	98	12.34	4.91	81	12.54	4.35	1.13	.62
Which To Solve	97	65.61	154.97	79	67.87	78.60	1.97*	1.35
Path Puzzles	93	19.80	13.62	81	18.00	19.08	1.40	2.95*

* Significant at or beyond the .05 level.
** Also significant beyond the .05 level by the Median test.

3. Hidden-Picture Items
4. Breadth-of-Information Items
5. Memory-for-Story Items
6. Attitude-toward-Curiosity Items
7. Preference-for-the-Unbalanced-and/or-Unfamiliar Items
8. Maze-Test Items
9. Code-Test Items
10. Foolish-Sayings-Test Items.

Picture- and story-satisfaction items. -- Three of the pictures and three of the stories that had been used in the first preliminary study were selected for use in the second on the grounds that they had elicited the most questions from the children. The three stories selected were The Train, The Snake, and Storm on the Mountain. The three pictures were Flying Fox Bat, Chinese Musical Instrument, and Manatee.

Since experience in the first study had shown that fewer questions were elicited when a number of stories or pictures were shown together, it was decided to present all stories and pictures singly in the second study. The mean number of minutes spent in working on the questions in the first study had not been significantly different for the sexes nor for curiosity groups. It was decided, therefore, to keep a record of only the order in which the children completed their questions. This was done because it was less time-consuming for the examiner to order the papers than to record exact times.

Table 18 shows the means, variances, and results of the tests of the significance of difference between means and between variances for the upper and lower thirds of the criterion curiosity group. Table 19 shows the same information for the upper and lower halves. Both mean number of questions asked and mean number of ideas expressed in the questions were significantly higher for the upper third than for the lower third of the curiosity group with only one exception. In all cases the difference was in favor of the upper third. When upper and lower halves were considered, five of the twelve differences were significant, and all were in favor of the upper half.

Although the samples were matched for IQ scores, the t test for independent samples was used instead of the t test for correlated samples. For this reason, the tests of significance are on the conservative side. Since it would be expected that the population distribution for questions asked would be skewed and since thirteen of the F ratios reached significance, all differences that were found to be significant by the t test were also tested by the Wilcoxon rank test. All were found to be significant at or beyond the .05 level by the Wilcoxon test.

It will be noted that the number of children whose questions were included in the analysis differed from story to story and picture to picture. This came about because no more than one story or picture was presented on any one testing day. With the number of tests to be given it was impossible to give retests to all children who were absent.

TABLE 18

MEAN, VARIANCE AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS AND VARIANCES OF QUESTIONS FOR PICTURE- AND STORY-SATISFACTION TESTS FOR UPPER AND LOWER THIRDS OF CURIOSITY GROUPS

	N	Upper Third		Lower Third		F	t
		Mean	Variance	Mean	Variance		
Stories							
Train							
No. of Questions	26	13.00	53.36	6.52	19.26	2.77*	3.86**
No. of Ideas		10.89	28.61	5.95	12.45	2.30*	3.92**
Snake							
No. of Questions	29	14.92	61.85	9.62	49.96	1.24	2.68**
No. of Ideas		12.31	29.79	8.45	33.26	1.12	2.59**
Storm							
No. of Questions	31	10.55	30.12	8.42	29.65	1.02	1.47
No. of Ideas		6.97	6.83	5.29	5.28	1.29	2.58**
Pictures							
Flying Fox Bat							
No. of Questions	30	10.60	57.49	7.00	12.24	4.70*	3.33**
No. of Ideas		9.47	38.05	6.54	11.38	3.34*	2.27**
Musical Instrument							
No. of Questions	31	10.58	38.85	6.62	6.17	6.30*	3.30**
No. of Ideas		7.48	9.39	5.59	3.54	2.65*	2.91**
Manatee							
No. of Questions	31	10.35	30.84	7.69	9.90	3.12*	2.31**
No. of Ideas		7.74	14.46	6.14	6.41	2.26*	1.95

* Significant at or beyond the .05 level.

** Significant by t test and by rank test.

TABLE 19

MEAN, VARIANCE AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS AND VARIANCES OF QUESTIONS FOR PICTURE- AND STORY-SATISFACTION TESTS FOR UPPER AND LOWER HALVES OF CURIOSITY GROUPS

	N	Upper Half		Lower Half		F	t
		Mean	Variance	Mean	Variance		
Stories							
Train							
No. of Questions	38	12.18	48.75	6.85	12.55	3.88*	4.20**
No. of Ideas		10.47	27.39	6.26	8.87	3.09*	4.29**
Snake							
No. of Questions	47	13.77	55.49	11.33	57.87	1.04	1.62
No. of Ideas		11.47	30.21	9.52	31.32	1.04	1.76**
Storm							
No. of Questions	51	10.67	29.95	9.10	26.73	1.12	1.48
No. of Ideas		7.27	7.88	5.98	6.98	1.13	2.35**
Pictures							
Flying Fox Bat							
No. of Questions	50	10.74	62.87	9.05	29.66	2.12*	1.30
No. of Ideas		9.64	42.81	8.26	21.15	2.02*	1.22
Musical Instrument							
No. of Questions	51	9.71	33.65	7.81	13.78	2.44*	1.96**
No. of Ideas		7.37	11.16	6.36	8.19	1.36	1.64
Manatee							
No. of Questions	49	9.92	29.66	8.45	16.69	1.78	1.55
No. of Ideas		7.92	16.22	7.13	10.07	1.61	1.08

* Significant at or beyond the .05 level.
**Significant by t test and by rank test.

Since order rather than time in which children completed their questions had been recorded, it was necessary to transform the ranks into standard scores to make the results from the various classrooms comparable. The papers had been numbered from one to the number of children in the room, with the first paper completed receiving the rank of one. The ranks were transformed without having been reversed with the result that the higher score indicates less time spent in writing questions and the lower score indicates more time.

As can be seen in Table 20, the children of the higher curiosity groups spent more time on the average in writing questions than did the children of the lower curiosity groups. The difference was significant in four instances. The children of the higher-curiosity groups spent significantly more time writing questions about the train story than did those of the lower-curiosity groups when either thirds or halves were considered. The difference between high and low thirds was significant for two of the pictures, Musical Instrument and Manatee.

When the difference between mean number of questions written by boys and girls for each of the pictures and stories was tested, no significant differences were found. In all cases except one, however, the mean number of questions written by the girls exceeded the mean number of questions written by the boys. When mean number of ideas expressed in the questions was considered, two significant differences were found. In both cases the questions written by the girls expressed the greater number of independent ideas. From an analysis of the order in which questions were completed, it appears that the boys and girls did not differ in amount of time spent in writing questions. Table 21 summarizes the findings relevant to sex differences in number of questions written, in number of ideas contained in the questions, and in time spent in writing questions.

The differing results obtained with the Picture- and Story-Satisfaction tests in the two preliminary studies were probably due to the differences in method of presenting the stories and pictures. In the first study more than one stimulus picture or story was presented at a time. In the second study all pictures and stories were presented singly. In the second study, the mean numbers of questions asked and the mean number of independent ideas expressed in the questions about the stories by the children of the higher-curiosity group were without exception greater than the means for the children of the lower curiosity group. The differences were particularly marked between upper and lower thirds.

The differences in favor of the girls which were observed in the first study were less marked in the second study. In the first study, without exception the averages in number of questions and in number of ideas expressed in questions were higher for the girls than for the boys; in the second study, there was one exception to this trend. In the second study, also, there were fewer significant differences between averages of number of questions written by boys and girls.

TABLE 20

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCES FOR STANDARD SCORES[1] OF RANK ORDER OF FINISHING WRITING QUESTIONS FOR PICTURE- AND STORY-SATISFACTION TESTS FOR UPPER AND LOWER THIRDS AND HALVES OF THE CURIOSITY GROUPS

Story or Picture	N	Upper Third Mean	Upper Third Variance	Lower Third Mean	Lower Third Variance	F	t
Train	26	45.85	97.90	54.14	95.53	1.02	3.04*
Snake	29	42.28	228.92	48.29	295.78	1.29	1.41
Storm	31	48.81	89.69	49.81	114.41	1.28	.53
Fox Bat	30	48.20	92.65	51.46	77.69	1.19	1.37
Instrument	31	46.71	89.88	53.62	95.82	1.07	3.86*
Manatee	31	47.26	60.18	51.97	101.86	1.69	2.06*
		Upper Half		Lower Half			
Train	38	47.18	109.34	53.18	81.66	1.34	2.67*
Snake	47	48.55	121.21	50.65	98.54	1.23	.97
Storm	51	49.84	87.70	50.14	104.92	1.20	.15
Fox Bat	50	48.98	107.49	49.19	95.27	1.13	.13
Instrument	51	48.06	106.14	50.53	86.69	1.22	1.25
Manatee	49	48.27	115.87	50.95	70.79	1.64	1.37

* Significant at or beyond the .05 level.

[1] The lower score indicates more time spent in writing questions.

TABLE 21

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE BETWEEN MEANS AND VARIANCES FOR QUESTIONS ASKED, FOR INDEPENDENT IDEAS EXPRESSED, AND FOR ORDER OF FINISHING[1] THE PICTURE- AND STORY-SATISFACTION TESTS FOR BOYS AND GIRLS

		BOYS			GIRLS			
	N	Mean	Variance	N	Mean	Variance	F	t
Train								
No. of Questions	81	8.68	35.42	71	9.41	30.30	1.17	.78
No. of Ideas		7.96	24.17		8.68	18.92	1.28	.94
Time		49.95	99.67		50.06	86.03	1.16	--
Snake								
No. of Questions	92	11.04	63.32	96	12.52	47.83	1.32	1.36
No. of Ideas		8.93	30.17		10.79	15.66	1.93	2.66*
Time		51.49	103.65		49.10	63.69	1.63	1.80
Storm								
No. of Questions	99	8.83	23.43	97	10.16	25.74	1.10	1.87
No. of Ideas		6.04	8.72		6.61	7.15	1.22	1.42
Time		51.11	103.20		49.08	82.97	1.24	1.47
Fox Bat								
No. of Questions	94	8.69	43.76	91	10.26	37.42	1.17	1.67
No. of Ideas		7.76	30.57		9.32	24.35	1.26	2.03*
Time		49.92	106.94		49.89	78.48	2.05*	--
Musical Instrument								
No. of Questions	99	8.90	32.01	95	8.52	21.47	1.49	.51
No. of Ideas		6.81	12.20		7.00	11.41	1.07	.39
Time		49.70	104.15		50.49	91.30	1.14	.55
Manatee								
No. of Questions	96	8.17	18.88	95	9.24	23.78	1.26	1.60
No. of Ideas		6.77	9.63		7.62	13.68	1.42	.49
Time		50.30	113.39		49.62	81.60	1.39	.48

* Significant at or beyond the .05 level.

[1] The smaller score indicates more time spent in writing questions.

The finding of no significant difference between boys and girls in amount of time spent in writing questions was the same for both studies. For curiosity groups, however, in the second study all differences indicated that the children of higher curiosity had spent more time in writing questions than had the children of lower curiosity; four of the differences were significant beyond the .05 level.

Preferred-behavior items. -- The What Would You Do test was used in the second study in a slightly longer form than the one which had been used in the first study and the scoring scheme was changed. In the first study, each of the four options to each item had been given a score of zero, one, two, or three; in the second study, the option which had previously been given a score of three was scored one and the other three options were scored zero. It was thought that this method of scoring would result in wider separation of mean scores for the curiosity groups.

When the results of the second testing were analyzed, as shown in Table 22, it was found that the high-curiosity group had scored higher than the low-curiosity group both as thirds and as halves. The difference between independent sample means yielded a t of 2.09 with a corresponding p of less than .025. The difference between means of high and low halves of the criterion group was 3.23; t was 2.80, the corresponding p less than .005.

TABLE 22

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF
DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES
OF SCORES ON THE WHAT-WOULD-YOU-DO
TEST FOR CURIOSITY GROUPS AND
FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	30	28.33	25.74	1.75	2.09*
Low Third	30	25.17	45.02		
High Half	48	28.38	24.92	1.57	2.80*
Low Half	48	25.15	39.20		
Girls	96	25.24	41.36	1.21	2.39*
Boys	93	27.38	34.21		

* Significant at or beyond the .05 level.

As in the first study, the boys' mean score was significantly higher than the girls' mean score. The difference between the means was 2.14 score points; t was 2.39, with a p of less than .01. It is not likely that sex differences in response to the test accounted for the differences between curiosity groups since the representation of the sexes in the curiosity groups was not greatly unbalanced. It appears that the What Would You Do test discriminates both between groups of boys and girls and between groups of high- and low-curiosity children.

Hidden-picture items. -- Two of the Hidden-Picture items were presented to the children in the second study. They were the Jungle and Arrowhead pictures which were selected because they had been the ones which had discriminated best between curiosity groups in the first preliminary study.

The papers were scored by crediting one point for each picture that was correctly identified and subtracting one point for each that was incorrectly identified. Table 23 shows that there were no significant differences between curiosity groups and none between sexes for finding the pictures. Table 24 shows only one significant difference in order of finishing. The difference between high and low thirds was significant with the children of the high-curiosity group spending more time in looking for the pictures.

TABLE 23

MEAN, VARIANCE, AND RESULT OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON HIDDEN-PICTURES TESTS FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

	N	Mean	Variance	F	t
Hidden-Pictures (Jungle)					
High Third	30	26.10	23.47	1.17	.90
Low Third	30	24.93	27.35		
High Half	50	26.22	34.99	1.52	.76
Low Half	50	25.38	23.02		
Girls	95	24.04	26.57	1.10	1.76
Boys	98	25.38	29.17		
Hidden-Pictures (Arrowheads)					
High Third	31	21.71	16.28	2.11	.53
Low Third	31	21.03	34.31		
High Half	51	21.96	20.12	1.89	1.29
Low Half	51	20.58	38.09		
Girls	97	20.38	24.86	1.13	.87
Boys	98	21.49	28.17		

TABLE 24

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE BETWEEN MEANS AND BETWEEN VARIANCES OF STANDARD SCORES FROM RANK ORDER OF FINISHING THE HIDDEN-PICTURES TESTS FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

	N	Mean[1]	Variance	F	t
Hidden-Pictures (Jungle)					
High Third	30	49.37	97.28	1.04	.28
Low Third	30	50.07	93.42		
High Half	50	48.74	109.67	1.49	.20
Low Half	50	48.98	73.37		
Girls	95	50.25	75.48	1.29	.49
Boys	98	50.91	97.67		
Hidden-Pictures (Arrowheads)					
High Third	31	45.90	72.49	1.38	2.05*
Low Third	31	50.77	99.70		
High Half	51	48.25	116.75	1.28	----
Low Half	51	48.26	90.93		
Girls	97	48.88	101.44	1.08	.87
Boys	98	50.16	109.23		

* Significant at or beyond the .05 level.

[1] Lower score indicates more time spent in looking for pictures.

It had been hypothesized that children of high curiosity would (1) be more attentive and therefore find more of the pictures, and (2) be more persistent and therefore spend more time in looking for the pictures. In the first preliminary study the evidence supported the first part of the hypothesis; in the second preliminary study, the evidence supported the second part. The difference in results may have been due to (1) the fact that a number of pictures were presented together in the first study while the pictures were presented singly in the second, and (2) the fact that more pictures were used in the first study. In the second study, the differences between means were all in favor of the higher curiosity group, but did not reach significance.

Breadth-of-information items. -- The What Do You Know test was used in the second study with no change in form or scoring scheme. The results were similar to those of the first study. As can be seen in Table 25, the mean of the high third of the curiosity group was significantly higher than the mean of the low third. The differences between the means of the high and low halves of the curiosity group and between the means of the boys and girls were not significant, although the difference between means of boys' and girls' scores was greater than in the first study.

TABLE 25

MEAN, VARIANCE, AND RESULT OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON THE WHAT-DO-YOU-KNOW' TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	31	17.26	16.26	1.10	1.73*
Low Third	31	15.34	17.88		
High Half	51	16.20	14.36	1.09	1.06
Low Half	51	15.38	15.72		
Girls	94	16.76	31.93	1.01	1.68
Boys	97	18.13	31.66		

* Significant beyond the .05 level by the one-tail test.

Memory-for-story items. -- The memory-for-story items used in the first study revealed no significant differences between curiosity groups. Since it was thought that too many different stories had been presented at one time, only one story was used in the second study. The story used was a rather long one filled with relatively little-known facts, mostly about animals.

The story was read aloud to the children although each was provided with a copy of his or her own. At the end of the story, the children were asked whether they liked it and what one thing they liked best about it. When the children finished writing, the papers were collected and nothing more was said about the story.

Seven days later a forty-item true-false test was administered to the pupils. Typical of the items are the following:

_____a. The liger has a mother that is a tiger and a father that is a lion.

_____b. The zoo-keeper has to give prairie dogs a lot of water or they will die.

_____c. Giraffes "talk" with their tails.

The test was read aloud as each pupil followed on his or her paper and answered the questions. Table 26 shows the mean, variance, and result of tests of significance of difference between means for boys and girls and for both high and low thirds and high and low halves of the curiosity group for the true-false test on the zoo story. The differences between means of curiosity groups were highly significant for thirds and for halves. The difference between the means for the boys and girls was not significant. From the results of this test, it appears that

TABLE 26

MEAN, VARIANCE AND RESULTS OF TESTS OF SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS ON QUESTIONS ABOUT THE ZOO STORY

Group	N	Mean	Variance	F	t
High Third	22	17.36	44.09	1.29	4.25*
Low Third	22	9.24	34.11		
High Half	33	15.89	46.24	1.00	3.37*
Low Half	33	10.19	46.10		
Girls	69	12.49	57.69	1.06	1.68
Boys	78	14.62	61.02		

* Significant at or beyond the .05 level.

children of high curiosity attend more closely to unusual information and are more likely to recognize statements based on such information when they later encounter them. The story and true-false test are included in Appendix C.

Attitude-toward-curiosity items. -- In the first preliminary study the What I Think test of attitudes toward information-seeking and exploratory behavior revealed no significant difference between curiosity groups, but did reveal a significant difference between the sexes. The form of the test used in the first study was composed of items in which names of boys and girls were used. Since some of the names were those of boys and girls in the classrooms, and since some of the statements could be thought of as derogatory, names were deleted in the second form. For example, the statement: "Larry looked inside Betty's new lunch box." which appeared in the first form was changed to "looked inside another person's new lunch box" in the second. Statements such as: "Helen is a busybody." which most of the children had considered to be derogatory were deleted and new items were substituted for them. A copy of the revised form is included in Appendix C.

The results from the revised test What I Think are shown in Table 27. No significant difference was found between the means of curiosity groups or between the means of the boys and girls. Although the revised form of the test revealed greater differences between the means of the curiosity groups than had been revealed by the first form, it revealed a smaller difference between the sexes.

Preference-for-the-unbalanced-and/or-unfamiliar items. -- The twenty items of the Which to Discuss test were not changed for the second study, but the test was doubled in length and whereas for the first study the test had been mimeographed, for the second study it was

TABLE 27

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCES OF HIGH- AND LOW-CURIOSITY GROUPS AND OF BOYS AND GIRLS ON THE REVISED WHAT-I-THINK TEST OF ATTITUDES

Group	N	Mean	Variance	F	t
High Third	29	36.83	129.86	1.06	1.59
Low Third	29	32.14	122.91		
High Half	46	35.85	108.80	1.25	1.46
Low Half	46	32.64	136.16		
Girls	96	33.00	128.63	1.21	1.10
Boys	91	34.91	155.59		

duplicated by a photographic process. A copy of the test as it was used in the second study is included in Appendix C.

Table 28 shows that although the differences between the means of the curiosity groups were in favor of the higher curiosity group for both halves and thirds, the differences did not reach significance. As was true with the first Which to Discuss test, the mean of the girls' scores did not differ significantly from the mean of the boys' scores. The Kuder-Richardson estimate of reliability for the new Which to Discuss test was .96.

Another way of measuring preference for unbalanced and/or unfamiliar items tried in the first preliminary study was the Which Saying Do You Believe test. This test was increased in length for the second study. It was increased from a 25-item test to a 42-item test. As is shown in Table 28, the means of the high-curiosity children's scores exceeded the means of the low-curiosity children's scores both for halves and thirds of the criterion group. The difference between the means of the boys' and girls' scores was not significant, but the girls' scores were significantly more variable than the boys' scores.

Maze-test items. -- Since the maze items called Path Puzzles used in the first preliminary study had seemed to be too easy to provide a real challenge to fifth-grade children, a new series of items was developed which, it was thought, would be both interesting and challenging. The new items are called Riddle Path Puzzles and require the examinee to trace a path through a maze of numbers in order to discover whether he or she has answered a riddle correctly. A copy of the items is included in Appendix C.

TABLE 28

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE BETWEEN MEANS AND BETWEEN VARIANCES FOR SCORES ON TESTS DESIGNED TO MEASURE PREFERENCE FOR THE UNBALANCED AND UNFAMILIAR FOR HIGH- AND LOW-CURIOSITY GROUPS AND FOR BOYS AND GIRLS

	N	Mean	Variance	F	t
Which To Discuss					
High Third	29	29.24	79.62	1.03	.32
Low Third	29	28.48	82.19		
High Half	47	29.40	58.51	2.29	1.26
Low Half	47	26.72	134.07		
Girls	97	26.86	144.35	1.36	.64
Boys	92	27.91	106.08		
Which Saying Do You Believe					
High Third	30	22.83	13.04	1.18	2.82*
Low Third	30	20.24	11.05		
High Half	50	21.82	12.61	1.00	2.73*
Low Half	50	19.88	12.56		
Girls	100	20.58	16.77	3.14*	1.64
Boys	98	21.35	5.34		

* Significant at or beyond the .05 level.

According to the directions for taking this test, the children needed only to take a guess at the answer to each riddle. They traced the path through the maze of numbers only if they wanted to know the correct answers. Tracing the path was considered evidence of the desire to know and, therefore, was given the higher number of score points.

The Riddle Path Puzzles were administered in two sessions because of the time involved. Unfortunately, there was a heavy snowstorm the night before the administration of the second part of the test so that the number of children taking the second part was greatly reduced.

As can be seen in Table 29, all differences between means of curiosity groups were in favor of the higher curiosity group. For Riddle Path Puzzles the difference was significant both for thirds and halves. Differences between means for boys and girls were insignificant.

Code-test items. -- The code test, called Which to Solve in the first study, had been used as a test of preference for the unusual and unfamiliar. It failed to reveal significant differences between curiosity groups in that study, but it had proved to be of great interest to the children. It was noted in the first study that many children wanted to solve the code. It was therefore decided to use it as a test to be solved in the second study with the thought that perhaps the children of higher curiosity would be superior in solving it. The code and messages were unchanged from what they had been in the first study.

TABLE 29

MEAN, VARIANCE, AND RESULT OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON RIDDLE PATH PUZZLES I AND II FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

	N	Mean	Variance	F	t
Riddle Path Puzzles I					
High Third	30	26.13	140.67	1.32	2.42*
Low Third	30	19.00	106.79		
High Half	50	23.31	110.84	1.04	1.88*
Low Half	50	19.32	114.96		
Girls	100	22.18	113.38	1.55	.45
Boys	98	21.56	73.37		
Riddle Path Puzzles II					
High Third	26	29.04	103.16	1.02	1.46
Low Third	26	24.95	101.55		
High Half	38	27.53	97.34	1.13	1.09
Low Half	38	24.97	110.39		
Girls	71	26.31	124.99	1.26	1.19
Boys	81	24.27	99.33		

* Significant at or beyond the .05 level, one-tail test.

In scoring the papers, credit was given for each symbol that was correctly solved, with the letters of the Roman alphabet given a score of one, the letters in odd positions given a score of two, and the letters from the ancient Ethiopian alphabet a score of three.

As Table 30 shows, the higher curiosity groups scored higher than the lower curiosity groups on the code test both as halves and as thirds. The difference between means was significant in both cases. The difference between the means of the boys and girls was also significant with the girls having the higher mean.

Foolish-sayings test items. -- If children of high curiosity are more aware of their environments than are children of low curiosity, a child of high curiosity should recognize absurdities more readily than would his low-curiosity counterpart. An absurdities test consisting of fifty-two items was developed to test this idea. Some of the items were common absurdities; others were straightforward statements. The children were told to mark the foolish statements with "X" and those that were not foolish with "C." The score for the test was obtained by subtracting the number of incorrect answers from the number of correct answers. A copy of the instrument is included in Appendix C.

TABLE 30

MEAN, VARIANCE, AND RESULT OF TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON THE CODE TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	30	248.70	4266.01	1.43	3.75*
Low Third	30	178.93	6122.23		
High Half	50	235.24	5740.06	1.17	1.71*
Low Half	50	208.20	6710.16		
Girls	92	238.11	4635.11	1.48	2.94*
Boys	95	205.52	6840.02		

* Significant at or beyond the .05 level.

TABLE 31

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON THE FOOLISH-SAYINGS TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	31	23.29	51.66	1.31	2.80*
Low Third	31	18.00	67.80		
High Half	51	23.06	53.76	1.36	2.50*
Low Half	51	18.77	73.17		
Girls	95	23.05	67.57	1.03	.55
Boys	96	22.40	65.60		

* Significant beyond the [illegible] level.

As can be seen in Table 31, the means of the higher curiosity groups were significantly higher than the means of the lower curiosity groups. The difference between the means of boys' and girls' scores was insignificant.

Summary of findings of second prelminary study. -- In the second preliminary study, the tests that had been used in the first study and altered according to the findings of that study were given another trial. One entirely new kind of test was tried in the second study, the Foolish Sayings test, which was intended to measure a child's ability to detect crucial aspects of sentences. It was thought that the child of high curiosity would attend more closely to environmental stimuli and, therefore, would be more likely to notice the absurdities in the Foolish Sayings test.

Since tables showing the findings for each test are included with the discussions, a summary table is not included here. Instead, a summary of findings of the second study are presented below. The findings are based on the analysis of tests given to the children in seven fifth-grade classrooms in New Castle Special School District, New Castle, Delaware.

1. Children of higher curiosity write more questions in response to picture and story stimuli than do children of lower curiosity; girls tend to write more questions than do boys.

2. Children of higher curiosity tend to spend more time in writing questions than do children of lower curiosity; girls do not differ from boys in amount of time spent in writing questions.

3. Children of higher curiosity prefer outgoing, exploratory activities to a greater degree than do children of lower curiosity; boys prefer such activities to a greater degree than do girls.

4. Children of higher curiosity tend to spend more time in looking for objects hidden in pictures than do children of lower curiosity; girls and boys do not differ in this respect.

5. Children of higher curiosity tend to have amassed a larger store of general information than have children of lower curiosity; girls and boys do not differ in this respect.

6. Children of higher curiosity remember more facts of an unusual nature than do children of lower curiosity; girls and boys do not differ in this respect.

7. Children of higher curiosity more often agree with sayings which advocate change and risk-taking than do children of lower curiosity.

8. Children of higher curiosity more often take the time and trouble to solve a maze in order to know the right answer to a riddle than do children of lower curiosity. Girls and boys do not differ in this respect.

9. Children of higher curiosity make higher scores on a task which involves solving a code made up of familiar, moderately unfamiliar, and unfamiliar symbols with the solution of the unfamiliar symbols contributing the highest proportion to the score. On the average, girls' scores exceed boys' scores on this task.

10. Children of higher curiosity are more accurate in identifying absurdities than are children of lower curiosity. Girls and boys do not differ in this respect.

Major Study

For use in the major study, many of the various kinds of test items that had discriminated between upper and lower criterion groups in the preliminary studies were combined into two batteries each of which could be administered in about forty-five minutes. In order to do this, most of the tests were shortened to fewer items than had been used in the preliminary studies. This, of course, reduced the reliability of each part when considered separately, but was necessary because of time allowances in the schools. Two tests did not fit into the forty-five minute batteries and were administered separately. These were the Which-to-Discuss test composed of designs of varying degrees of balance and familiarity, and the Zoo-Story test consisting of true-and-false questions about the story containing little-known facts about animals.

The tests which were shortened and administered as batteries were referred to collectively as Batteries A and B. Battery A consisted of What Would You Do, Which Saying Do You Believe, Code, Jungle Picture, and Train Story. Battery B consisted of What Do You Know, Foolish Sayings, Path Puzzle, Arrowhead Picture, and Chinese Musical Instrument. The tests used in the major study may be found in Appendix D.

The tests were administered to the children in twenty-five fifth-grade classes of the Mount Pleasant, Alfred I. DuPont, Stanton, and Newark Public Schools. The sample is described elsewhere. (Supra pp. 50-51.)

In order to be consistent, the results for the various kinds of items are discussed in as nearly as possible the same order as was used in the two preceding sections. The analysis follows the pattern used in the preliminary studies. Tests of significance between means of curiosity groups are conservative since tests for independent samples were used.

Picture-and-story-satisfaction items. -- The story and picture used in the major study as stimuli for questions were the Train Story and the Chinese-Musical-Instrument picture. They were placed at the ends of Battery A and Battery B, respectively. It was thought that since each was the last task of its testing period, the children would not be as tempted to hurry through their questions as they might be if they knew another task awaited them.

When the questions were studied for differences between curiosity groups, it was found that the average number of questions written by the children of the higher curiosity groups exceeded that of the children of the lower curiosity groups for both story and picture. The differences, however, did not reach significance. Also, when the number of independent ideas expressed in the questions was considered, the differences between higher and lower curiosity groups were small. As Table 32 shows, the differences were not significant at the .05 level.

TABLE 32

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCES FOR QUESTIONS WRITTEN BY CHILDREN OF THE HIGH-AND LOW-CURIOSITY GROUPS

	N	Mean	Variance	F	t
Story					
No. of Questions					
High Third	118	9.24	22.87	1.15	1.33
Low Third	118	8.36	19.86		
High Half	221	8.94	21.81	1.14	1.03
Low Half	221	8.51	19.14		
No. of Ideas					
High Third	118	4.82	2.81	1.06	.45
Low Third	118	4.72	2.98		
High Half	221	4.75	2.71	1.14	----
Low Half	221	4.74	2.37		
Picture					
No. of Questions					
High Third	117	9.91	21.92	2.37*	1.38
Low Third	117	9.19	9.25		
High Half	220	9.49	18.29	1.31	1.31
Low Half	220	8.98	14.45		
No. of Ideas					
High Third	117	6.12	6.65	1.28	1.50
Low Third	117	5.97	5.21		
High Half	220	6.36	8.61	1.16	.96
Low Half	220	6.12	7.41		

* Significant at or beyond the .05 level.

Differences between boys and girls in mean number of questions asked and between mean number of independent ideas expressed were marked. As

Table 33 shows, the girls wrote significantly more questions than the boys and expressed significantly more independent ideas in their questions for both the story and the picture. When checked by the Median test, the differences between the sexes in number of questions and number of independent ideas expressed were found to be significant.

TABLE 33

MEAN AND VARIANCE OF NUMBER OF QUESTIONS WRITTEN BY BOYS AND GIRLS CONCERNING A STORY AND A PICTURE; RESULTS OF TESTS OF SIGNIFICANCE BETWEEN MEANS AND VARIANCES

	N	Mean	Variance	F	t
Story					
No. of Questions					
Girls	360	9.39	21.92	1.07	3.36*
Boys	330	8.21	20.45		
No. of Ideas					
Girls	360	4.93	2.92	1.02	3.38*
Boys	330	4.49	2.98		
Picture					
No. of Questions					
Girls	352	10.06	17.30	1.07	5.00*
Boys	333	8.51	16.12		
No. of Ideas					
Girls	352	6.31	5.61	1.06	5.22*
Boys	333	5.37	5.29		

* Significant at or beyond the .05 level.

The distributions of number of questions and number of independent ideas expressed in questions for the total group of children participating in the major study were as follows:

Story; Number of Questions

Number	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 24	26 27	28 29	30 31	Total
Frequency	7	48	126	125	124	90	62	45	28	16	10	4	1	1	2	1	690

Story; Number of Independent Ideas

Number	0	1	2	3	4	5	6	7	8	9	Total
Frequency	2	14	49	106	143	136	132	73	34	1	690

Picture: Number of Questions

Number	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 25	26 27	Total
Frequency	6	32	83	136	120	118	86	49	26	18	7	3	0	1	685

Picture: Number of Independent Ideas

Number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Frequency	1	16	32	53	99	119	91	98	77	57	26	13	1	1	1	685

Preferred-behavior items. -- The What Would You Do test was administered in a somewhat shortened form in the major study. The results of the testing were found to be in keeping with the findings of the preliminary studies. The mean of the high curiosity group exceeded the mean of the low curiosity group both as halves and as thirds. In both cases the difference was highly significant. The mean of the boys' scores exceeded the mean of the girls' scores, a difference that was also highly significant. The means, variances, and results of tests of significance of the differences between means and variances for curiosity groups and sexes can be seen in Table 34. Since the significant difference between variances for the sexes made the use of the t test questionable, the Median test was applied. Chi square for these data was found to be 50.86, which is highly significant.

TABLE 34

NUMBER, MEAN AND VARIANCE OF SCORES OF CHILDREN OF THE HIGH- AND LOW-CURIOSITY GROUPS AND OF BOYS AND GIRLS ON THE PREFERRED-BEHAVIOR TEST; RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCES

	N	Mean	Variance	F	t
High Third	118	13.97	13.69	1.21	3.32*
Low Third	118	12.31	16.52		
High Half	221	13.84	14.32	1.09	4.22*
Low Half	221	12.29	15.58		
Girls	360	12.01	11.89	1.42*	7.29*
Boys	330	14.15	16.83		

* Significant at or beyond the .05 level.

The distribution of scores for the entire group in the major study was as follows:

What Would You Do

Score	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Frequency	6	8	11	20	32	36	60	70	77	72	58	54	43	50	33	20	17	16	6	1

Total -- 690

Hidden-picture items. -- Two pictures, The Jungle and Arrowheads, were presented to the children in the major study. The directions to the pupils and the method of scoring were unchanged from those used in the preliminary studies. When the results were analyzed, no significant differences were found between the means of high and low curiosity groups. As can be seen in Table 35, there were significant differences in variability between the curiosity groups. For the Jungle Picture, the scores of the lower curiosity groups were more variable than the scores of the higher curiosity groups; for the Arrowhead Picture, the scores of the high third were more variable than the scores of the low third.

TABLE 35

MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND VARIANCES OF SCORES ON HIDDEN-PICTURE ITEMS FOR CURIOSITY GROUPS AND SEXES

	N	Mean	Variance	F	t
Jungle Picture					
High Half	221	8.24	1.13	1.90*	1.17
Low Half	221	8.10	2.15		
High Third	118	8.17	1.48	2.61*	1.42
Low Third	118	7.87	3.86		
Girls	360	8.12	1.00	1.06	--
Boys	330	8.14	.94		
Arrowhead Picture					
High Half	220	23.15	15.00	1.14	.24
Low Half	220	23.06	17.12		
High Third	117	22.56	17.99	1.69*	.58
Low Third	117	22.85	10.63		
Girls	352	22.89	16.99	1.26*	2.63**
Boys	333	23.68	13.53		

* Significant at or beyond the .05 level.

** Also significant when tested by the Median test.

No differences were found between boys' and girls' scores for the Jungle Picture. For the Arrowhead Picture, scores of boys and girls differed both in variability and in means. The girls' scores were significantly more variable; the mean of the boys' scores was significantly higher. Because of the significant difference in variability between boys' and girls' scores, the Median test was applied. Chi square was found to be 5.70; the corresponding p, less than .025. It appears that the difference between the means of the boys' and girls' scores is a significant one.

The distributions of scores for the total group were as follows:

Arrowheads Picture

Score	7	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	32
Frequency	1	5	6	9	8	10	9	9	16	14	16	28	35	37	57	104	115	118	68	19	1

Total -- 685

Jungle Picture

Score	0	1	2	3	4	5	6	7	8	9	10	Total
Frequency	3	0	1	0	8	9	26	85	252	297	9	690

Breadth-of-information items. -- The What Do You Know test was shortened to eighteen items for use in the Major Study. The directions to the pupils and the scoring scheme were unchanged. The results of the analysis of the test results are given in Table 36. The means of the scores of the higher curiosity group exceeded the means of the lower curiosity group both as halves and as thirds. In both cases the difference was highly significant.

The mean of the boys' scores was significantly higher than that of the girls. This finding was at variance with the finding of no significant difference between boys' and girls' mean scores in the first preliminary study, but more nearly in accord with the finding of a near-significant difference in the second.

The distribution of scores for the total group is shown below:

What Do You Know

Score	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
Frequency	2	5	10	18	46	59	72	91	88	92	65	59	37	27	7	6	1	685

TABLE 36

NUMBER, MEAN, VARIANCE, AND TESTS OF THE SIGNIFICANCE OF
THE DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES
OF SCORES ON THE WHAT-DO-YOU-KNOW TEST FOR
CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	117	10.30	5.74	1.35	2.60*
Low Third	117	9.44	7.75		
High Half	220	10.35	7.75	1.05	3.89*
Low Half	220	9.30	8.15		
Girls	352	9.62	8.29	1.09	3.82*
Boys	333	10.46	7.60		

* Significant at or beyond the .05 level.

__Memory-for-story items__. -- The story about the trip to the zoo and the questions about the story that had been used in the second preliminary study were used without alteration in the major study. One week's time was allowed to elapse between the reading of the story and the presentation of the true-false test based upon the story.

The results of the testing as shown in Table 37 were entirely consistent with the findings of the preliminary study. The means of the scores of the higher-curiosity children exceeded the means of the scores of the lower-curiosity children both for halves and for thirds. Both differences were highly significant. The difference between mean scores of boys and girls was not significant.

The distribution of scores for the total group was as follows:

Questions About the Zoo Story

Score	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	Total
	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	658
Frequency	4	10	11	11	30	27	34	63	84	59	78	77	73	41	32	17	7	

__Preference-for-the-unbalanced-and/or-unfamiliar items__. -- The Which To Discuss test was completely revised before being used in the major study. Three figures were used in each set instead of two, and the test was lengthened to forty items. The pupils were asked to select the one figure from each group of three which they would be most interested in hearing about if there were a story attached to each figure. In most of the sets there was one figure that was clearly more unbalanced or unfamiliar than the other two. In a few sets the figures were equal in degree of balance and/or familiarity. The latter items were

TABLE 37

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON QUESTIONS ABOUT THE ZOO STORY FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	119	19.29	45.92	1.12	2.65*
Low Third	119	17.01	40.99		
High Half	219	19.43	41.57	1.11	3.81*
Low Half	219	17.18	37.29		
Girls	337	18.00	46.73	1.03	1.09
Boys	320	18.56	45.38		

* Significant at or beyond the .05 level.

not included in the scoring and were included in the test in order to conceal the intent of the testing from the pupils and to break any particular set in answering which they might have established. In scoring each set, the highest number of score points was awarded for the selection of the most unbalanced and/or unfamiliar design.

The results of the analysis can be seen in Table 38. The means of the high curiosity group exceeded the means of the low curiosity group both as halves and as thirds, and the mean of the girls' scores exceeded the mean of the boys' scores. Since the scores of the low curiosity group were significantly more variable than the scores of the high curiosity group and the scores of the boys were significantly more variable than the scores of the girls, the use of the t test with these data could be questioned. Therefore, the rank test was applied. The differences between High and Low Halves and between boys and girls were found by the rank test to be significant at the .02 and .01 levels, respectively.

The distribution of scores for the total group is shown below:

Which To Discuss

Score	3 5	6 8	9 11	12 14	15 17	18 20	21 23	24 26	27 29	30 32	33 35	36 38	39 41	42 44	45 47	48 50	51 53	54 56	57 59	60 62
Frequency	2	3	9	7	7	11	12	17	17	19	28	43	60	65	91	122	80	73	24	3

Total -- 693

The Which-Saying-Do-You-Believe test. -- The Which-Saying-Do-You-Believe test, intended to test the hypothesis that children of high curiosity more often agree with statements advocating action,

TABLE 38

NUMBER, MEAN, VARIANCE, AND RESULT OF TESTS OF SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON THE WHICH TO DISCUSS TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	121	45.22	94.52	1.49*	1.84*
Low Third	121	42.63	140.86		
High Half	222	44.70	104.40	1.29	2.25**
Low Half	222	41.31	135.09		
Girls	356	44.68	96.74	1.49*	3.65**
Boys	337	41.64	144.33		

* Significant at or beyond the .05 level.
** Also significant when tested by the Rank test.

change, and/or risk-taking than do children of low curiosity, was shortened to sixteen items and became a part of Test Battery A in the major study. Agreement with a statement advocating action, change, and/or risk-taking was given a score of one; agreement with a statement advocating inaction, contentment with the status quo, and avoidance of risk was given a score of zero.

The results of the analysis of test results for these items can be seen in Table 39. The differences were in the hypothesized direction for curiosity groups, but significantly so only for thirds. The difference between means for boys and girls was insignificant.

The distribution of scores for the total group was as follows:

Which Saying Do You Believe

Score	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Frequency	1	12	28	51	84	119	134	119	83	45	10	3	1	690

Riddle-path-puzzle items. -- Two of the Riddle Path Puzzles, "Window" and "Cabbage," were selected for use in the major study. As in the second preliminary study, high scores went to the pupils who solved the puzzles in order to know whether they had answered the riddles correctly.

As can be seen in Table 40, the means of the scores of the higher-curiosity children exceeded the means of the lower. The difference was significant at the .05 level by a one-tail test. The difference between means for boys and girls was in favor of the girls but was not significant.

TABLE 39

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON THE WHICH-SAYING-DO-YOU-BELIEVE TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	118	8.98	3.67	1.01	1.68*
Low Third	118	8.54	3.71		
High Half	221	8.97	3.38	1.42	1.16
Low Half	221	8.75	4.80		
Girls	360	8.87	3.91	1.19	--
Boys	330	8.81	4.66		

* Significant beyond the .05 level by the one-tail test.

TABLE 40

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON RIDDLE PATH PUZZLES FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	112	12.49	33.36	1.06	1.65*
Low Third	112	11.19	35.40		
High Half	209	12.25	33.75	1.03	1.91*
Low Half	209	11.16	34.92		
Girls	337	12.14	37.15	1.23	1.14
Boys	321	11.57	45.77		

* Significant at or beyond the .05 level; not significant when tested by the rank test.

The distribution of the scores of the total group of fifth-grade children who were present for both administrations of Test B and thus attempted to solve both puzzles is shown below.

Riddle Path Puzzles

Score	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	Total
Frequency	48	33	45	46	63	84	68	38	26	207	658

Code-test items. -- The Code test was used in the major study without alteration. The directions to the pupils and the scoring procedures were the same as those used in the second preliminary study. The results can be seen in Table 41. The means of the scores of the higher-curiosity children exceeded those of the lower-curiosity children both for halves and thirds, but the differences were not significant at the .05 level. On the average, girls scored significantly higher than boys on the Code test.

For the total group the Code test yielded the distribution shown below.

	Code														
Score	0 9	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 99	100 109	110 119	120 129	130 139	Total
Frequency	14	11	18	19	66	46	59	40	31	52	50	42	35	207	690

TABLE 41

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF SCORES ON THE CODE TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	221	89.79	1447.36	1.07	.86
Low Third	221	85.46	1541.44		
High Half	118	90.76	1435.95	1.01	1.03
Low Half	118	87.06	1425.93		
Girls	360	90.37	1341.30	1.06	4.29*
Boys	330	84.15	1419.00		

* Significant at or beyond the .05 level.

Foolish-sayings-test items. -- The Foolish Sayings test was shortened to twenty-two items and was included in Test B in the major study. The directions to the students were to mark a statement that was foolish with "X" and a statement that was not foolish with "C." The score on the test was the number of statements marked correctly. The results shown in Table 42 were consistent with the findings of the preliminary study. The high-curiosity group means were significantly higher than the low-curiosity group means both as halves and as thirds. There was no significant difference between means of scores of boys and girls.

TABLE 42

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AND BETWEEN VARIANCES OF FOOLISH-SAYINGS TEST FOR CURIOSITY GROUPS AND FOR BOYS AND GIRLS

Group	N	Mean	Variance	F	t
High Third	117	16.15	2.33	1.79*	3.04**
Low Third	117	15.39	4.53		
High Half	220	15.85	8.13	1.23	2.27*
Low Half	220	15.26	9.97		
Girls	352	15.48	6.60	1.34	--
Boys	333	15.49	4.91		

* Significant at or beyond the .05 level.
** Also significant when tested by z and Rank tests.

The distribution of scores for the total group was as follows:

Foolish-Sayings Test

Score	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Frequency	4	6	4	19	36	62	79	103	117	117	84	38	12	3	1	685

Batteries A and B. -- Both Battery A and Battery B discriminated between upper and lower portions of the curiosity group at a significant level. The difference between the means of boys' and girls' scores was not significant for Battery B, but was significant for Battery A. These results are presented in Table 43.

For Batteries A and B picture-and story-satisfaction items were scored both for number of questions and for number of independent ideas expressed in questions. For the total scores on which the analysis of Table 43 was based, however, only the score for number of questions was included since it was the more objective score. In obtaining the total score for Battery A the excessive influence of the Code test which was due to its disproportionately large standard deviation was eliminated by weighting. The total score for Battery B was obtained by summing the scores of the subtests.

Since the standard scores derived from the sum of ranks based on teacher, peer, and self judgment of curiosity were available for all children for whom complete data had been gathered, they were correlated with the total scores for Batteries A and B. The correlation coefficients were .30 for Battery A and .32 for Battery B. These coefficients are at the lower end of the scale for usefulness in prediction.

TABLE 43

NUMBER, MEAN, VARIANCE, AND RESULTS OF TESTS OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS OF SCORES ON BATTERIES A AND B FOR UPPER AND LOWER HALVES OF THE CURIOSITY GROUP AND FOR BOYS AND GIRLS

	N	Mean	Variance	F	t
Battery A					
High Half	221	39.56	30.68	1.18	3.45*
Low Half	221	37.66	36.11		
Girls	360	37.95	51.08	1.09	2.31*
Boys	330	39.20	46.90		
Battery B					
High Half	220	38.90	97.19	1.17	3.30*
Low Half	220	36.08	114.01		
Girls	352	38.38	121.81	1.04	1.50
Boys	333	37.33	117.34		

*Significant at or beyond the .05 level.

The distribution of scores for Battery A and Battery B were as follows:

Battery A

Score	15 17	18 20	21 23	24 26	27 29	30 32	33 35	36 38	39 41	42 44	45 47	48 50	51 53	54 56	57 59	60 62	63 65	66 68
Frequency	2	0	7	13	39	70	109	108	123	81	62	40	23	5	6	1	0	1

Battery B

Score	15 17	18 20	21 23	24 26	27 29	30 32	33 35	36 38	39 41	42 44	45 47	48 50	51 53	54 56	57 59	60 62	63 65	66 68	69 71
Frequency	1	5	10	12	19	38	54	61	67	73	88	74	70	38	36	19	16	1	3

Estimates of Reliability. -- Reliabilities for the various kinds of tests were estimated by test-retest, split-half or item-consistency methods. All reliability coefficients reported in Table 44 were computed by product-moment correlation from test-retest data with the exception of those for Which to Discuss and Zoo Questions which were computed by split-half and Kuder-Richardson methods, respectively. The coefficients are based upon the scores of the 360 children for whom complete data were accumulated. The test-retest coefficients for Battery A and Battery B were .52 and .66, respectively. The reliability coefficients reported for questions about the Train story and the Musical Instrument picture are based on quantity of questions rather than quality of questions since the former is the more objective measure.

Table 44 gives the names of the various tests and, in parentheses, some identification such as what the test is thought to measure or what the test requires of the testee.

TABLE 44

RELIABILITY COEFFICIENTS FOR TESTS
AS USED IN THE MAJOR STUDY

Kind of Test	Reliability Coefficient
What Would You Do (Preferred behavior)	.77
Which Saying Do You Believe (Conservatism; Caution)	.46
What Do You Know (Breadth of information)	.67
Foolish Sayings (Attention; Detection of absurdities)	.58
Musical Instrument (Questions about a picture)	.66
Train (Questions about a story)	.75
Path Puzzles (Persistence; Desire to know)	.35
Hidden Pictures (Persistence; Attention)	.70
Code (Persistence; Desire to know; Attention)	.49
Which to Discuss (Preference for unbalanced and/or unfamiliar)	.91
Zoo Questions (Memory for unusual information)	.81

Summary of findings in the major study. -- In the major study a number of the tests used in the two preliminary studies were combined into Batteries A and B. The various tests were shortened so that each battery could be administered in forty-five minutes. Two other tests, the Zoo or Memory-for-Story test and the Which to Discuss test, were administered separately. The separate tests and two Batteries were administered to the children of twenty-five fifth grade classes in New Castle County, Delaware.

When the scores were analyzed, it was found that the children of the higher-curiosity groups had significantly higher averages on both Battery A and Battery B than did the children of the lower-curiosity groups. The mean of the boys' scores on Battery A was significantly higher than the mean of the girls' scores. On Battery B, the girls' mean was higher than the boys' mean, but not significantly so.

Of the subtests comprising Batteries A and B, What Would You Do, What Do You Know, Which Saying Do You Believe, Riddle Path Puzzles and Foolish Sayings brought out significant differences between higher- and lower-curiosity groups with the higher-curiosity group obtaining the higher mean in each case. The subtests revealing sex differences were Picture and Story Satisfaction, What Would You Do, Arrowhead Picture, What Do You Know, and Code, with the girls' means being significantly higher on Picture and Story Satisfaction and Code and the boys' means being significantly higher on What Would You Do, What Do You Know, and Arrowhead Picture.

Both Memory-for-Story and Which to Discuss brought out significant differences between higher-and lower-curiosity groups. Which to Discuss also revealed a sex difference. The means of the girls' scores on this test were significantly higher than the means of the boys' scores. In variability, the scores on Which-to-Discuss test of the highest third of the curiosity group differed significantly from those of the lowest third and the scores of the boys differed significantly from those of the girls.

Composite scores based upon a combination of teacher, peer, and self judgment of curiosity were correlated with scores on Batteries A and B for 360 children. The relationship in each case was positive and significant, but was too low to justify the use of either battery alone to predict composite scores.

Summary and Conclusions

The results of the three studies, two preliminary and one major, were not expected to agree in all aspects since some changes in procedures, materials, and subjects were made from one study to the next. In this section similar and divergent findings and factors that may have been responsible for the divergencies are pointed out.

The differences between upper and lower curiosity groups in number of questions and number of independent ideas in questions about stories and pictures were not significant in the first nor in the final study. In the second study the differences were in most cases highly significant. In both the first and final studies, the stimulus stories or pictures were not presented alone. In the first study several stimulus pictures or stories were presented at a time; in the final study one stimulus picture or story was presented in a battery with other tests. Only in the second study was one picture or story presented by itself as an independent task. Since the stimulus pictures and stories and directions to the pupils remained the same, the differing results found in the second study seem to be due to presenting only one task at a time.

A sex difference in questions asked was found in all studies. The girls consistently wrote more and better questions on the average than did the boys.

The preferred behavior test, What Would You Do, yielded results that were consistent throughout the three phases of the study. The higher-curiosity groups had significantly higher means than the lower-curiosity groups; boys had significantly higher means than girls.

Analysis of scores on Hidden Pictures showed a consistent tendency for higher-curiosity groups to do better than lower-curiosity groups and for boys to do better than girls. Level of significance varied from one phase of the study to another and seemed to be dependent upon the number of pictures used. The greatest difference and highest level of significance of difference between means of curiosity groups and between means of boys and girls was obtained when the greatest number of pictures was used.

On the breadth of information test, What Do You Know, results throughout the three phases of the study were consistent. High-curiosity group means were significantly higher than low-curiosity group means in all phases. Boys' means were higher than girls' means in all phases, but were significantly higher only in the final phase. In the final phase, a shortened form of the test was used and a much larger group of children was tested.

The Memory-for-Story test used in the first part of the study differed greatly from that used in the second and final. The first consisted of a number of short stories; the latter consisted of one long story. The first revealed no difference between curiosity groups or between boys and girls. The latter revealed that the children of the higher-curiosity groups remembered significantly more on the average than did the children of the lower-curiosity groups. The differences between mean scores of boys and girls were not significant.

The test of attitude toward curiosity, the What-I-Think test, was used only in the first two phases of the study. It was dropped from the third phase because of limited testing time in the schools. The test was altered rather drastically between its first and second administrations. The results in the two phases were consistent but all of the differences did not reach significance. The high curiosity groups had consistently higher means indicating a more favorable attitude toward curiosity, but these differences did not reach significance. Boys' means were consistently higher than girls' means, and in the first study this difference was highly significant. The differences between findings in the two studies seem to be due to the changes in the test questions.

Several tests were used to test preference for the unbalanced and/or unfamiliar. One, the Which-to-Discuss test, was lengthened and somewhat altered as to form before being used in the final study. This was done because it was thought that the intent of the makers of the test was too obvious to the pupils when the test was used on successive years in the same school district. In all phases of the study, the higher-curiosity groups had higher mean scores than the lower-curiosity groups. These differences were significant in the first and final phases of the study. Boys and girls did not differ in their scores on the first form of the test, but on the longer form used in the final phase of the study the girls' mean was significantly higher than the boys' mean. Why the altered test brought out a sex difference is unknown.

The Which-Saying-Do-You-Believe test yielded results that were consistent throughout the three phases of the study even though it was shortened considerably for the final phase. The higher-curiosity groups had means that were significantly higher than those of the lower-curiosity groups. Boys' and girls' mean scores on this test did not differ significantly from each other in any phase of the study.

In the first phase of the study, the Code test was called Which to Solve and was used to measure preference for the unfamiliar and unusual. It brought out no significant differences between curiosity groups or between sexes. In the second phase of the study it was called the Code test and was used to measure persistence and ability to solve the code. In this phase, significant differences were found between curiosity groups and between the sexes with the higher-curiosity groups and the girls having the higher means. In the final phase, the Code test was used as it had been used in the second phase. Although the higher-curiosity groups had higher means than the lower-curiosity groups, the differences were not significant. Girls' means were significantly higher than boys' means. The significant differences between boys' and girls' means on the Code test in the second and final phases are probably due to the higher verbal skills required in solving the code. In the first phase of the study the children were not asked to solve the code.

In the first phase of the study the maze test, Path Puzzles, was used to test persistence and ability to solve the mazes. High- and low-curiosity group means were not significantly different for this test, but the boys' mean was significantly higher than the girls' mean. The test was believed to be too easy for fifth grade children so was altered drastically and was called Riddle Path Puzzles for the second and final phases of the study. On Riddle Path Puzzles higher-curiosity groups consistently had higher means than lower-curiosity groups. These differences were significant except for the second path puzzle in the second phase. Probably due to the greater demand for verbal skills in the riddle path puzzles, the significant difference between boys' and girls' means found in the first study was not found in the second and final.

The Foolish-Sayings test was consistent when used in two phases of the study in showing significant differences among curiosity groups with the higher-curiosity groups having the higher means. It revealed no significant difference between means of boys and girls.

Chapter V

Summary and Conclusions

It was the major purpose of this study to explore the possibilities of developing paper-and-pencil instruments to measure curiosity in elementary school children. More specifically, answers were sought for the following questions:

1. Can curiosity be measured with paper-and-pencil instruments?
2. Can curiosity be measured by using test situations that disturb the child sufficiently to cause him to explore further in order to restore equilibrium?
3. Can curiosity be measured by using instruments which introduce novelty into familiar settings?
4. Can curiosity be measured by using test items similar to those used for measuring breadth of knowledge?
5. Can curiosity be measured by test items that indicate persistence?
6. Can curiosity be measured by test items that indicate the child's attitude toward curiosity?
7. Can curiosity be measured adequately by using a single type test item?

Defining Curiosity

Although curiosity has been discussed for centuries by philosophers, theologians, and psychologists, there is no single precise definition acceptable to all. In fact, there is a widely divergent opinion as to whether or not curiosity, itself, is beneficial or harmful, i.e. whether or not it is good or evil.

Therefore, it was essential that curiosity be defined for this study. Such a definition had to show those elements considered to make up curiosity. In addition, in order to be helpful in guiding the research, the definition had to be stated in terms of children's behavior in the classroom. After asking people in informal and formal interviews what they thought about children's curiosity, reviewing the literature on the topic, and studying older and modern dictionary definitions of the word, it was concluded that an elementary school child manifested curiosity to the extent that he:

1. reacts positively to new, strange, incongruous, or mysterious elements in his environment by moving toward them, by exploring them, or by manipulating them.
2. exhibits a need or a desire to know more about himself and/or his environment.
3. scans his surroundings seeking new experiences.
4. persists in examining and exploring stimuli in order to know more about them.

Importance of the Study

Since curiosity has been discussed for such a long period of human history, giving rise to many and sundry opinions of its nature, any study aimed at clarification of curiosity should be a worthwhile undertaking for this purpose only. Recent knowledge, however, raises questions regarding the role of curiosity in creativity, problem solving, and some types of learning. Therefore, the more information obtained about curiosity, the better this role will be understood.

After recognizing the general values of studies about curiosity, it is interesting to note that very little attention has been given to the study of elementary school children. When compared with the number of studies into the curiosity of lower animals, the number of studies into the curiosity of children is small. However, if it is to be maintained at a high level and even increased in many cases, curiosity of school children must be studied. In order to do this, children differing in their manifestation of curiosity must be identified efficiently, effectively, and economically. The latter was the specific objective of this investigation.

Limitations of the Study

The investigation was conducted in 38 fifth-grade classrooms in New Castle County, Delaware. The fifth grade was selected to avoid, as far as possible, children with developmental reading problems and children whose interests were crystallized as is often the case of junior- and senior-high-school pupils.

New Castle County is a suburban area outside of Wilmington. The majority of the people residing in the area have settled there recently in order to work in the large industries, especially chemical.

The investigation was carried out in three stages -- two preliminary studies and the major study. The mean IQ for the children in the six classrooms of the first preliminary study was 103; the mean IQ for the children in the seven classrooms of the second preliminary study was also 103; however, the mean IQ for the children in the 25 classrooms of the major study was 115.

All instruments were administered either by the director or the co-director. The latter administered no tests during the two preliminary studies, but observed the reaction of the children to the tests.

Each of the three studies was conducted within a ten-week period. In some cases, children were absent when particular tests were given. Attempts were made to make up the missing tests, but there were some children who could not be reached.

Review of the Literature

The literature pertaining to curiosity was reviewed for three purposes. In addition to conventional reasons such as ascertaining the procedures and the results of prior investigations, the literature was also studied for information helpful in defining the term "curiosity," itself. The latter contribution is discussed below.

The literature pertaining to curiosity can be divided according to two broad and somewhat overlapping rubrics. Most of the material is theoretical or statements of opinion; some of it is based on empirical studies. Of the latter, the majority were conducted in laboratories with animals.

Many of the earlier opinions expressed a doubt as to the value of curiosity. However, for the most part, curiosity is now considered necessary for survival in a scientific age.

Theoretical statements or opinions regarding curiosity. -- Those writing about curiosity have been mainly concerned with at least one of the following questions:

1. What is the nature of curiosity?

2. What are the ways of stimulating or depressing curiosity?

3. How valuable is curiosity to society?

Nowhere in the literature is there a precise statement as to the nature of curiosity. The relative influence of heredity and environment has been discussed at length with some writers accepting curiosity as an instinct and others stressing facts showing that it is acquired.

One school of psychology considers curiosity an investigatory reflex expressing itself in exploratory behavior and manipulation. Another group of writers points out that it is a perceptual function and that the organism may exhibit neurotic and destructive behavior in satisfying its desire to know, in other words, in seeking to know at any cost. A number of writers have considered it a need probably always present to some degree in living creatures, but others try to show that it will not manifest itself unless a drive is blocked.

With so little precise knowledge regarding the nature of curiosity, it is understandable that suggestions as to ways of improving or depressing curiosity should also be stated in general terms. Some writers blame the lack of curiosity in older children on the lack of stimulation in their environments, especially in the schools where it is claimed that it is easier to teach knowledge than to help children develop curiosity. In order to do the latter it is necessary to give adequate experiences that will help stimulate the questioning attitude; help the child find satisfactory answers by avoiding a squelching attitude on the one hand and giving pedantic, dogmatic answers on the other; and build a feeling of confidence in the child. In summary, speculations on how to strengthen curiosity in children have indicated a need for developing sound mental and physical health, a large source of knowledge, many opportunities for gratifying the desire to know, and sufficient novelty to challenge an ongoing organism.

Statements regarding the value of curiosity are even less specific than those pertaining to its nature and development. Although many early writers questioned the value of curiosity, most modern authors seem to accept it as a positive attribute unless it becomes extreme or is manifested in a destructive manner. Usually curiosity functions in persons of sound mental health in such a manner as to stimulate the mind of the individual and the culture of the society. It is basic to the nature of all scientists, many of whom have made accidental and important discoveries which they would not have if they had not been curious. This has led some writers to state that curiosity may be more important than genius in research.

Empirical investigations into curiosity. -- By far the largest number of empirical studies have been conducted with animals. Many species from cockroaches to monkeys have been used to study manipulatory and exploratory behavior. Two types of studies have been predominate, namely:

1. Attempts to discover the etiology of curiosity.

2. Efforts to identify variables influential in its development.

Such variables as heredity, intelligence, richness and novelty of environment, hunger, fear and sex have been investigated.

Empirical studies of curiosity in human beings are of more recent origin than such studies of lower animals. The original studies were concerned primarily with the quantity and quality of questions asked by children. These investigations indicated that such variables as intelligence, socio-economic status, sex, and age made a difference in the content and number of questions asked. More recently the investigations have been concerned with such aspects of personality as need for approval, scholastic motivation, nervous behavior, need for achievement and social adjustment.

Finally, research has completed the circle by returning to the original question posed, "What is the nature of curiosity?" Is it uni- or multi- dimensional? Only suggestions have appeared to date. What is known has been found to be tenuous, if not inaccurate, leaving more questions than answers.

Establishing Validity

Before designing any instruments for measuring curiosity, it was necessary to develop ways of establishing their validity. Three steps were taken. First, as stated earlier in this summary, an operational definition of curiosity was set forth. Secondly, children's behavior was rated by several judges in terms of this definition. Finally, variables that might influence such judgments were studied and taken into account.

Determining criterion groups. -- To validate the instruments designed to measure curiosity, two groups -- one high in curiosity, the other low -- were established. In order to do this, three groups of judges were selected -- the children's teachers, the children's peers, and the children themselves.

To assist these judges in making their ratings, three types of instruments were developed. Each instrument was constructed to include all aspects of the operational definition. In addition, the instruments used by children were either carefully controlled in terms of vocabulary or were read to them.

Each teacher was given the definition of curiosity together with an illustration of children's behavior for each part of it. The teacher was told that all of the kinds of behavior included might not be observable in any one child, but that it was reasonable to suppose that the more of them a child showed, the more curious he was. The teacher was also cautioned that the child who showed the most curiosity might not be the one who was making the best classroom adjustment.

After being given these directions, each teacher was asked to rate the pupils in his class. This was done by first selecting the child considered to have the most curiosity, then the child considered to have the least curiosity and continuing this process until all the children were placed.

During the second preliminary study, the teachers of seven classes made two rankings separated by a period of eight weeks. A mean r of .77 was obtained.

This procedure was not appropriate for the children to use to evaluate their peers. Therefore, an instrument called the Who-Should-Play-the-Part test was created. The children were given the description of eight roles -- four of children whose behavior was an example of high curiosity and four whose behavior was an example of low curiosity. The raters were told to select children in their classrooms who were generally most like the characters required for the play.

In order to obtain an estimate of reliability for this instrument, each class used in the second preliminary study was divided into two equal parts. The children were ranked according to the ratings each received from each half of the class and rank order correlations were calculated for each class. The mean correlation coefficient was .45.

The pupils were asked to evaluate themselves. They did this on a 41-item self-rating instrument entitled About Myself. The children were told that there were no "right" or "wrong" answers, that the best answer for any item was what they thought was true about themselves. Although the majority of the items were stated in terms of behavior that logically indicated curiosity, some statements were used that implied just the opposite.

An estimate of reliability of the self-rating instrument was obtained with the 158 cases comprising the population of the first preliminary study. By using the split-half method with the first 40 items and the Spearman-Brown formula for correlation, an estimated reliability coefficeint of .91 was obtained.

Examining variables influencing judgments. -- Several variables were thought to be influential in determining the judgments of curiosity made by teachers and peers. Among these were age, grade, race, sex, popularity, and intelligence.

Since all three of the studies were conducted in fifth grades, the effect of neither age nor grade was studied. Also, there were insufficient children of non-Caucasian origin to permit adequate testing of the effect of this variable. In those classes where there were several Negro children, their placement as to curiosity did not seem to be unduly influenced by their race.

Since the children were at the pre-adolescent stage, it seemed logical that sex rivalry might influence the judgments. To determine whether or not this was true, the rankings which pupils of each sex gave to like-sex and opposite-sex peers in the first preliminary study were correlated with each other and with the rankings made by the teachers. The majority of the correlations were moderate to high. All of them were positive.

These findings indicated that there was considerable agreement among boys, girls, and teachers in judging curiosity. They did not answer the question of whether, on the whole, members of one sex were judged to be more curious than members of the other. Two approaches were made to answer this question.

Using data from the first preliminary study, the differences between the means of the scores the peers had assigned to the boys and girls and the differences between the number of boys and girls the teachers had placed in the upper and lower halves of the classes were examined. Since some of the groups were more variable than others, the differences between the means were tested with the Mann-Whitney U test. In no case were the differences between the means significant at the .05 level.

The teachers in the first preliminary study, in general, placed more boys than girls in the upper half of the class but this arrangement was not consistent. When tested using the chi-square technique, the differences were not significant. In the light of the evidence it seemed safe to assume that the ratings were not unduly influenced by sex preference. It was further assumed that these findings would be consistent in the second preliminary study and in the major study. Therefore, the latter studies were not examined for sex bias.

Sex, however, was controlled in selecting criterion groups, especially in the major study. This was done because some of the test items developed to measure curiosity were suspected to favor one sex and other test items seemed to be more favorable to the other.

The substantial correlations found between the judgment of teachers and pupils raised a question as to whether or not this agreement was due to popularity. In other words, did teachers and peers tend to rate popular pupils high in curiosity and less popular pupils low? In order to determine the popularity of the children, the Ohio Social Acceptance Scale was administered. This scale is a sociometric instrument from which a score for each child can be derived.

The judgments of the teachers had been made by ranking the pupils. Therefore, tau and partial tau, nonparametric techniques, were used to determine the effect of popularity on the correlation between teacher judgment and peer judgment. In all classes, the differences between the taus and the partial taus were so slight that it could be assumed that the effect of popularity on the judgments was negligible.

Intelligence was found to be substantially related to both teacher judgment and peer judgment of curiosity. The correlations between intelligence and teacher judgment ranged from .43 and .67; those between intelligence and peer judgment from .32 and .63. In all cases, the relationships were positive and significant.

It was necessary, therefore, to take intelligence into account when establishing criterion groups. Two different procedures were used. The first based on regression equations was employed in the first preliminary study. In the second preliminary study and in the major study, the children in the criterion groups were matched on the basis of intelligence as well as other variables.

In order to obtain groups of pupils of high and low curiosity independent of intelligence in the first preliminary study, lines of regression of curiosity on intelligence were drawn for each class and pupils whose scores deviated from the regression lines were selected. Pupils whose scores were at least one-half standard error of estimate above the regression line were included in the high curiosity group; those whose scores were at least one-half standard error of estimate below the regression line were included in the low curiosity group. This was done separately for teacher and peer judgment. The high-curiosity and low-curiosity groups established from the two different judgments were then compared. Only pupils who were placed similarly by the two judgments were retained in the tentative criterion groups.

The five regression equations based upon teacher judgment of curiosity were not significantly different from each other; those based upon peer judgment were. In the latter case, a regression equation was written for the five classes as one group. The groups yielded by the use of this equation did not differ from those established by the use of the five separate equations.

In the first preliminary study, fifteen children were judged by both teachers and peers to exhibit more curiosity than would be predicted on the basis of their intelligence quotients. In the same manner, twenty children were judged to exhibit less curiosity. The two groups were found not to differ significantly as to age, sex, popularity or intelligence. The limited number of Negroes made it impossible to reach any conclusions about race. Two Negroes were included in the criterion groups, one in the high curiosity group and one in the low group.

The self judgments of the children in the criterion groups were examined. The difference between the means was significant at the .005 level when the t test was used. The difference between the variances of the two groups was not significant at the .05 level when the F test was employed.

In the second preliminary study and in the major study, it seemed more appropriate to use self judgments directly in the establishment of the criterion groups. In order to do this, the following steps were taken:

1. The Lorge-Thorndike Verbal and Nonverbal Intelligence Tests were administered.
2. The ratings of the three judges -- teachers, peers, and self -- were combined into composite ratings.
3. The composite scores of the children in each class were ordered from high to low.
4. Each class was divided into halves and thirds as far as possible. Some adjustments of necessity had to be made when the number of pupils in a class did not permit the class to be divided precisely into halves and thirds.
5. A child in the upper half of a given class was matched with a child in the lower half of that class or any of the other classes used in the study on the basis of verbal IQ, nonverbal IQ, and age. In the major study, sex was also used as a basis of matching.
6. The same procedure was followed in selecting pupils from the high and low thirds.

By this procedure, 51 high-curiosity children and 51 low-curiosity children were selected to form the criterion groups from the upper and lower halves in the second preliminary study. When the upper and lower thirds were used, the criterion groups consisted of 31 pupils. The means of the ages of the criterion groups ranged from 127.42 months to 129.54 months, the means of the verbal IQ's from 103.29 to 103.80, and the means of the nonverbal IQ's from 99.97 to 101.71.

In the second preliminary study, sex was not a variable considered in the matching. However, when the number of boys and girls in the upper criterion groups was compared with the number in the lower groups by using the chi-square technique, the differences were found to be insignificant. Since other findings indicated that there were significant differences between the sexes on some of the tests designed to measure curiosity, it seemed appropriate to control the sex variable more rigorously in the major study.

In the major study, 113 boys and 114 girls were selected for the upper half and 113 boys and 114 girls for the lower half. In the upper and lower thirds, there were 62 boys and 62 girls. The means of the ages of the criterion groups ranged from 130.30 months to 130.98 months, the means of the verbal IQ's from 113.30 to 113.76, and the means of the nonverbal IQ's from 110.05 to 111.01.

The means of the IQ's of the children in the major study were considerably higher than those of the children in the two preliminary studies. The first two studies were based on samples drawn from school districts specifically selected because their pupils were considered fairly representative of elementary school children generally. The sample used in the major study included areas where the ratio of highly-skilled persons to the total population is large because scientific personnel associated with major chemical industries and many of the faculty of the state university reside there.

Developing Measuring Instruments

In the three studies, sixteen different types of items were developed to measure curiosity. Items of each type were arranged into instruments to be administered to the classes selected for the studies. Some items used in the first preliminary study were deleted from later studies; some were modified; new types of items were added in the second preliminary study as a result of information gleaned from the first preliminary study.

Not only was the nature of some of the items modified from the first preliminary study through the major study, but the organization of the items into measuring instruments was also changed on the basis of earlier findings. In some instruments only the wording or design of some of the items was altered. In other instruments the number of items used was increased and in still others the number was decreased.

On the basis of findings from the first preliminary study, the procedure of administering some items was changed. For example, it was discovered that when children were stimulated to ask questions and, at the same time they had to complete other tests, there was no significant difference between children of high curiosity and children of low curiosity.

However, when a single stimulus was used and used alone to elicit questions, the differences in favor of the high curiosity groups were very significant.

The first preliminary study . -- The testing for the first preliminary study included thirteen different kinds of items described as follows:

1. *Picture-and story-satisfaction items* were used because it was believed that the child high in curiosity would ask more and better questions than the child low in curiosity. Short one-paragraph stories and simple pictures were used to stimulate these questions.

2. *Preferred-behavior items* were administered on the assumption that children differing in curiosity also would differ in the activities they would prefer. All of the children were asked what they would do when given four choices for a particular set of circumstances.

3. *Hidden-picture items* were developed to measure that aspect of the definition of curiosity which states that " . . . an elementary school child exhibits curiosity to the extent that he persists in examining and exploring stimuli in order to know more about them." The items used were a series of pictures, specifically designed for this investigation, in which the pupils could find the answers to questions if they searched long enough.

4. *Breadth-of-information items* were utilized because it was hypothesized that one who is curious about his environment will have gathered a larger store of general information than will one who is less curious, although the tested IQ of the two may be the same. These items of information were obtained from children's encyclopedias.

5. *Memory-for-incomplete stories items* were employed to test whether or not children with high curiosity would pay closer attention to stories and have better immediate memory for facts than children with low curiosity. Twelve short stories -- six complete and six incomplete -- were used.

6. *Attitudes-toward-curiosity items* were based on the assumption that a child who feels comfortable about being curious is more likely to sustain his curiosity. An instrument of forty items was devised in which the pupils were asked to judge the behavior of certain named children as to whether it was "very good," "good," "neither good nor bad," "bad," "very bad."

7. Preference-for-the-unbalanced-and/or-unfamiliar items were developed to measure the part of the definition of curiosity which reads that a child manifests curiosity to the extent that he "reacts positively to new, strange, incongruous, or mysterious elements in his environment by moving toward them, by exploring them, or by manipulating them." The following four types of instruments were designed for this purpose:

   a. A test consisting of twenty pairs of geometric figures and symbols, one of which was more balanced and/or familiar than the other. The children were asked to select the member of each pair they wanted to have discussed.

   b. An instrument similar to the one mentioned above but in which the children were required to encircle the member of each pair which they thought was the more pleasing.

   c. A test composed of twenty-five pairs of contrasting proverbs, one of which indicated a willingness to try something new or to take a chance. The children were to indicate which of the sayings they thought was more true most of the time.

   d. A code made up of properly positioned Roman letters, improperly positioned Roman letters, and modified Ethiopian letters. The children were not asked to solve the code but merely select the five signs from each code in which they had the highest interest.

8. Maze-test items were used to measure the extent to which high-curiosity children will persist in seeking information. The mazes were drawn so that the pupils had to solve them in order to find answers to questions which were asked.

9. Satisfaction-with-evidence items were developed because it was assumed that children who were high in curiosity would be less likely than children who were low to be satisfied with guessing or estimating the answers to questions. The test consisted of four familiar optical illusions. In each case, the pupil was asked to decide which member of a pair of straight lines, curves, or circles was the larger.

The second preliminary study. -- Twelve types of items were used in the second preliminary. However, only three types were used for the first time in this phase of the investigation. Eight of the instruments used in the first preliminary study were modified in either form, size, scoring, or administration. Some editorial changes were made in all instruments. One instrument, the breadth-of-information test, was not changed except to remove editorial errors.

The three instruments designed specifically for the second preliminary study include:

1. A new memory-for-story test to replace the one used in the first preliminary study was developed. It consisted of a single rather long story filled with little-known facts, mostly about animals. After completing the story, the children were asked if they liked the story and what they did or did not like about it. A week later without prior knowledge, the pupils were asked to answer a number of questions about the story.

2. A new set of maze items was used to supplant the first maze test which had been found to be too simple for fifth grade children. The new maze items consisted of riddles with an adjacent number maze. Children were asked to answer the riddle and if they wished to be absolutely certain of their answer to solve the adjacent number maze.

3. Foolish-sayings-items were developed to test the hypothesis that if it is assumed that children of high curiosity are more aware of their environments than children of low curiosity, then high-curiosity children should be more aware of verbal absurdities than their low-curiosity counterparts. In order to test this hypothesis, a fifty-two item instrument consisting of common absurdities and straightforward statements was used. The children were asked to identify the two types of statements.

On the basis of the findings of the first preliminary study, the following changes were made in the items used in that study:

1. Picture-and story-satisfaction items. Fewer items were used and whereas in the first preliminary these items were presented as a group, they were administered individually in the second preliminary study.

2. Preferred-behavior items. The number of items used was increased. The scoring was changed so that each foil received a score. Only the foil having the highest curiosity rating was scored in the first preliminary study.

3. Hidden-picture items. Only two of these items were used in the second preliminary study.

4. Attitude-toward-curiosity items. Whereas in the first preliminary study names of children were attached to each kind of behavior the pupils were asked to judge, the names were removed for the second preliminary study.

5. Preference-for-the-unbalanced-and/or-unfamiliar items. The test using geometric figures and symbols was doubled in size and duplicated by an improved process. The test utilizing proverbs was also increased in length.

6. Code items. -- The same codes were used in the second preliminary study as in the first. However, in the second, the code test was used to measure persistence since the child was asked to actually solve the code.

The major study. -- Eleven types of items were used in the major study. Nine types were combined into two batteries, two types were administered as separate instruments. They were the memory-for-story test used for the first time in the second preliminary study and the preference-for-the-unbalanced-and/or-unfamiliar test employing geometric figures and symbols. The former was used in its original form; the latter was altered. These changes included using three figures or symbols rather than two, and inserting some items which were neither unbalanced nor unfamiliar.

In order to administer the two batteries in a reasonable length of time in the classrooms, all of the tests included had to be shortened. In some cases such as the picture-and story-satisfaction test and the hidden-picture test only one item could be used. Only two items of the maze test were used.

The two batteries that were formed were referred to as Tests A and B. Test A included samples of the following:

1. Preferred-behavior items
2. The proverb type of preference-for-the-unbalanced-and/or unfamiliar items
3. Code test items
4. Hidden-picture items
5. Story-satisfaction items

Test B included samples of the following:

1. Breadth-of-information items
2. Foolish-sayings items
3. Maze items
4. Hidden-picture items
5. Picture-satisfaction items

Findings of the Investigation

In order to set forth the findings of the investigation, it will be necessary to describe them under three somewhat overlapping rubrics. First, the results obtained by using the different types of instruments will be pointed out. Secondly, answers to the original questions will be given in terms of the data thus obtained. Finally, information regarding the nature of curiosity in elementary school children which seemed to be uncovered in the investigation will be reported.

Results of instruments to measure curiosity. -- The results of the three studies were not always consistent. In part this was expected since there were changes in procedures, materials, and subjects brought about by the information learned in the earlier studies. The findings for each type of item are as follows:

1. Whenever stories or pictures were presented to children singly as was done in the second preliminary study, high-curiosity children tended to ask significantly more and better questions than low-curiosity children. This finding is not affirmed when stories and pictures are presented in groups or with other types of items. Whenever such stories or pictures were presented, girls tended to ask more and better questions than boys although such differences were not always significant. The latter findings seem to hold whether the stories or pictures are presented singly, in groups, or with other test items.

2. If children were given a choice of activities, those who had high curiosity selected outgoing, adventurous behavior significantly more frequently than did their low-curiosity counterparts. All three studies revealed the same results. As would be expected in this culture, boys scored significantly better on the instrument than did girls.

3. If hidden pictures were used to measure persistence in seeking answers, the results showed a consistent tendency for higher curiosity groups to do better than lower curiosity groups, and for boys to do better than girls. The level of significance varied from study to study and seemed to depend upon the number of pictures used -- the more pictures the greater the significance of difference between curiosity groups and between boys and girls.

4. In all three studies, high-curiosity children tested significantly higher than low-curiosity children on tests of information. Boys did better than girls on these tests in all cases, but the difference between the means of boys and girls was significant only in the major study.

5. If children were asked to recall immediately information in a number of short stories, some of which were incomplete, there were no significant differences between the response of curiosity groups nor between the responses of boys and girls.

6. If children were asked to read and to listen to one very long story and then were asked one week later about that story, high-curiosity children recalled significantly more facts than did low-curiosity children. Boys and girls did not differ significantly in this measurement.

7. When asked to evaluate behavior exemplifying curiosity, high-curiosity children tended to have better attitudes toward curiosity than low-curiosity children and boys tended to have better attitudes than girls. This finding was consistent in both studies where attitudes were measured, but the differences between the means of curiosity groups and between the means of the sexes were not significant except in one instance. In the first preliminary study, the boys' mean was significantly higher than the girls' means.

8. When the pupils were asked to determine which geometric symbol or figure they would like discussed, high-curiosity children selected the unbalanced and/or unfamiliar ones more frequently than low-curiosity children. This finding was true even when the structure of the instrument was altered and lengthened. Although the groups differed, the differences were not consistent. No differences existed between boys and girls when the earlier tests were used. The girls' means were significantly higher than the boys' means in the major study.

9. When faced with a decision as to which of two proverbs was true most of the time, high-curiosity children selected significantly more frequently proverbs which implied taking a chance or moving away from a status quo than did low-curiosity children. This finding was consistent in all studies. Girls and boys did not differ in this respect.

10. When, as in the first preliminary study, the code test was used to measure preference for the unfamiliar and unusual, it revealed no significant differences between curiosity groups nor between the sexes.

11. When the same instrument was used as a measure of persistence, high-curiosity children did better than low-curiosity children. The differences between the means were significant in the second preliminary study but not in the major study. Girls scored significantly better than boys each time the test was administered.

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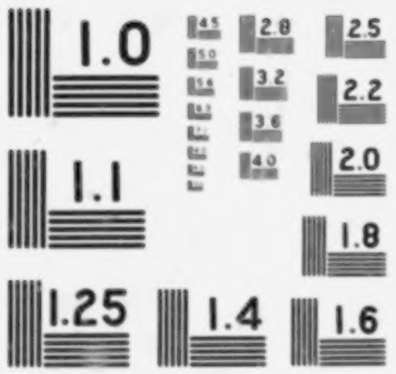
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1.4
1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963

12. The maze test administered in the first preliminary study to measure persistence showed no differences between curiosity groups. The boys' mean, however, was significantly higher than the girls' on this test.

13. In the second preliminary study and in the major study, the maze test was increased in difficulty. For the most part, the means of the high-curiosity groups were significantly higher than the means of the low-curiosity groups. Whereas boys did better than girls in the first test, the opposite was true with the later test. The increase in need for verbal competency in the second form of the test may have contributed to these differences.

14. When asked to identify verbal absurdities, high-curiosity children exceeded low-curiosity children to a significant degree the two times the test was administered. The sexes did not differ in this ability.

Answers to original questions raised in the study. -- It was originally the purpose of this investigation to seek answers to seven questions. It is appropriate, therefore, that each question should not only be answered, but should also be evaluated in terms of present data and future research.

1. Can curiosity be measured with paper-and-pencil instruments? If by the question it is meant, are there paper-and-pencil instruments that will identify with a high degree of accuracy curiosity in any given child, the answer must be no. If the question refers to the selection of groups of children, then this investigation reveals that it is possible to measure curiosity in school children with a reasonable degree of accuracy. Such accuracy should be improved as the crude instruments developed for this study undergo refinement and development in future studies. If the level of curiosity in an individual child is to be accurately measured, individually administered instruments probably will have to be designed.

2. Can curiosity be measured by using test items that disturb the child sufficiently to cause him to explore further in order to restore his equilibrium? No effort was made in this investigation to measure the degree that questions or problems disturbed a child. However, some items were developed which were supposed to cause a pupil to keep working until he was satisfied. To the extent that such items disturbed the child and to the extent these items measured curiosity this question can be answered in the affirmative. Stimulating children to ask questions, to seek answers hidden in pictures, to solve

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codes, to seek answers by tracing mazes were tasks employed to answer this question. Later studies may show a more precise relationship between measures that disturb children and the revelation of their level of curiosity.

3. Can curiosity be measured by using test items which introduce novelty into familiar settings? The majority of the items used in this investigation were designed to incorporate some level of novelty. Since, in general, positive results were obtained with these instruments, it appears that novelty might well be a factor in tests of curiosity. However, further researchers will have to try out similar instruments lacking in such novelty before a definite answer can be given. Both the test using unusual and unfamiliar designs and the proverbs test seem to indicate that high-curiosity children do seek the unusual and unfamiliar, or novel, more frequently than low-curiosity children.

4. Can curiosity be measured by using test items similar to those used for measuring breadth of knowledge? All evidence in this study indicates that such items can be used for this purpose. The information test and the Zoo-story test affirm this finding. Although the groups of high-curiosity children and the groups of low-curiosity children in this investigation had the same mean intelligence, it is reasonable to assume that not all facets of intelligence were measured by the instruments used. It is quite possible that these children differed in aspects of intelligence not revealed by the test of intelligence used. In fact, what has been called curiosity may itself be a part of intelligence. Only further studies in the area of intelligence will clarify this issue.

5. Can curiosity be measured by using test items that indicate persistence? The evidence from the hidden-picture test, the code test, and the riddle-number-maze test indicates that high-curiosity children are more persistent than low-curiosity children. It does not follow that either curiosity or persistence is the cause of the other. Both may stem from underlying factors in the children's make-up. Only as new information is obtained regarding the physical, personal, and social variables of children high in curiosity can this question have a meaningful answer.

6. Can curiosity be measured by using test items that indicate the child's attitude toward curiosity? Efforts to measure attitudes toward curiosity in this investigation were disappointing. Although there appeared to be a tendency for high-curiosity children to have better attitudes toward curiosity, the evidence was not clear.

7. Can curiosity be measured adequately by using a single type of test item? Until curiosity can be defined more precisely than it is at the present time, several types of test items may probably be used. Curiosity may be a unique factor and, as such, may be unidimensional. The evidence obtained in these three studies tends to support the idea of a multidimensional structure of curiosity. Future studies involving factor analysis may answer this question.

Characteristics of children with high curiosity - What then can be said regarding children with high curiosity? Can anything be reported on the basis of data obtained in this investigation? It was not originally the intention of the investigator to look for characteristics differentiating high- and low-curiosity children. Yet, in order to design measuring instruments these characteristics had to be considered. Throughout the report, they were clearly apparent. They are repeated here for the sake of emphasis since they could serve as focal points for other studies of curiosity and of its relation to curriculum planning. On the basis of the three studies composing this investigation, high-curiosity children as compared to low-curiosity children are those who:

1. ask more and better questions,
2. select more outgoing, adventurous activities,
3. have more general information about the world in which they live,
4. can recall more specific facts,
5. relate more frequently to the unbalanced and unfamiliar,
6. persist longer at problem solving, and
7. are more alert to verbal absurdities.

Future Studies

Perhaps the greatest contribution of an investigation of this nature is that it can act as a stimulus for future studies. The broad spectrum of this investigation by its very nature suggests an incompleteness on the one hand and possibilities for seeking more specific answers on the other.

As the reader questions the techniques used and/or the results obtained, he will be discovering studies begging to be done. The researchers recognizing the limitations of both techniques and the findings as given in this report suggest the following studies:

1. Each instrument developed in this investigation must be further refined. Not only those instruments which seemed to separate high- and low-curiosity children with some degree of success, but also those that did the task less well must be examined.
2. New types of items must be designed and tried out. Until there is a high degree of certainty that curiosity is unidimensional, efforts must be continued in the measurement of what, at this time, appear to be several aspects of curiosity.
3. More information should be obtained regarding the physical, personal and social variables differentiating high-curiosity children from low-curiosity children.
4. The knowledge obtained about curiosity should be tried-out in specific courses and in the curriculum in general, in the elementary school.
5. The present investigation conducted with fifth-grade children should be replicated at all other grade levels.
6. The present investigation conducted in regular classrooms in suburban areas should be replicated with rural children, urban children, and children residing in less chance areas.
7. The present investigation conducted with what might be considered "normal" children should be replicated with children with special problems, e.g., mentally retarded, superior, physically handicapped, hard of hearing, deaf, poor visioned, blind, and emotionally handicapped.
8. More information needs to be obtained relative to the place of curiosity in different cultures. Several studies comparing the curiosity of children in different countries with the curiosity of children in the United States might be pursued.
9. Genetic studies should be undertaken to determine what, if any, changes take place in curiosity as school children develop from nursery school through college.
10. Better methods for validating the instruments used to measure curiosity should be developed.
11. New procedures and instruments need to be developed so teachers and administrators can better judge the quality and quantity of curiosity in individual children.

12. Factor analytic studies need to be conducted in order to definitely identify those factors, if more than one, making up what is defined as curiosity.

13. In light of these studies and others, curiosity must be redefined in such a way that it will be more meaningful and helpful to researchers, teachers, and school administrators.

14. A theory of curiosity in the elementary school child needs to be developed. Such a theory should utilize information secured in many studies of curiosity, but should not be bound to such data. The theory should give a meaningful description of curiosity, but above all it should raise many questions requiring answers. In other words, it should stimulate further research into children's curiosity.

BIBLIOGRAPHY

1. Ashbaugh, E. J. Curiosity. *School and Society*, 1929, 30, 590-3.

2. Averill, L. A. *The Psychology of the Elementary School Child*. New York: Longmans, Green and Co., 1949.

3. Baker, Emily V. Children's questions and their implications for planning the curriculum. *Teachers' College Record*, 1945, 46, 390-1.

4. Benjamin, H. R. W. That which renders men incurious. *Childhood Education*, 1940, 16, 95.

5. Berber, E. *Psychologie der Neugier*. Leipzig: Borth, 1935.

6. Berlyne, D. E. An experimental study of human curiosity. *British Journal of Psychology*, 1954, 45, 256-65.

7. ____________, A theory of human curiosity. *British Journal of Psychology*, 1954, 45, 180-91.

8. ____________, Attention, perception and behavior theory. *Psychological Review*, 1951, 58, 139-46.

9. ____________, Attention to change, conditioned inhibition ($s^{I}r$) and stimulus satiation. *British Journal of Psychology*, 1957, 48, 138-40.

10. ____________, *Conflict, Arousal, and Curiosity*. New York: McGraw-Hill Book Co., 1960.

11. ____________, Conflict and information - theory variables as determinants of human perceptual curiosity. *Journal of Experimental Psychology*, 1957, 53, 399-404.

12. ____________, Novelty and curiosity as determinants of exploratory behavior. *British Journal of Psychology*, 1950, 41, 68-80.

13. ____________, The arousal and satiation of perceptual curiosity in the rat. *Journal of Comparative and Physiological Psychology*, 1955, 48, 238-46.

14. ____________, The influence of complexity and novelty in visual figures on orienting responses. *Journal of Experimental Psychology*, 1958, 55, 289-96.

15. ____________ and Slater, J., Perceptual curiosity, exploratory behavior, and maze learning. *Journal of Comparative and Physiological Psychology*, 1957, 50, 228-32.

16. Beyer, Evelyn, Some questions children ask and how to answer them. *Childhood Education*, 1940, 16, 201-4.

17. Branley, F. M. Curiosity. Grade Teacher, 1958, 76, 54+.

18. Brill, A. A., editor. The Basic Writings of Sigmund Freud. New York: Modern Library, 1938.

19. Brower, C. H. Curiosity and discontent: the value of a college education. Vital Speeches, 1953, 20, 157-58.

20. ________. Keys to achievement. Readers' Digest, 1956, 69, 99-101.

21. Butler, R. A. Incentive conditions which influence visual exploration. Journal of Experimental Psychology, 1954, 48, 19-23.

22. ________ and Harlow, H.F. Persistence of visual exploration in monkeys. Journal of Comparative and Physiological Psychology, 1954, 47, 258-63.

23. Carr, R. M. and Williams, C. D. Exploratory behavior of three strains of rats. Journal of Comparative and Physiological Psychology, 1957, 50, 258-63.

24. Chance, M. R. A. and Mead, A. P. Competition between feeding and investigation in the rat. Behaviour, 1955, 8, 174-82.

25, Cofer, C. N. Motivation, pp. 173-202. In Farnsworth, P. R. and McNemar, Q. Annual Review of Psychology, Volume 10. Palo Alto: Annual Reviews, 1959.

26. Conn, J. H. Sexual curiosity of children. American Journal of Diseases of Children, 1940, 60, 1110-19.

27. Cordell, A. Answering children's questions through science experiences. School Science and Mathematics, 1949, 49, 395-401.

28. Courtis, S. A. Developing an inquiring mind. Childhood Education, 1940, 16, 197-200+.

29. Curiosity. Saturday Evening Post, 1939, 211, 22.

30. Darchen, R. Sur le comportement d'exploration de Blatella germanica. Exploration d'un plan. Journal de Psychologie Normale et Pathologique, 1959, 54, 190-205.

31. Davis, E. A. The form and function of children's questions. Child Development, 1932, 3, 57-74.

32. Dember, W. N. and Earl, R. W. Analysis of exploratory, munipulatory, and curiosity behaviors. Psychological Review, 1957, 64, 91-96.

33. Derieux, J. C. A child comes questioning. Good Housekeeping, 1937, 105, 34+.

34. Dewey, J. and Bentley, A. F. Knowing and the Known, Boston: The Beacon Press, 1949.

35. Ecclesiasticus.

36. Emch, M. On "the need to know" as related to identification and acting out. International Journal of Psychoanalysis, 1944, 25, 13-19.

37. Evans, B. Our responsibility to the intelligent. National Parent Teachers, 1956, 51, 8-10.

38. Fahey, G. L. and Corey, S. M. Inferring level of mental activity from pupils' classroom questions. Journal of Educational Research, 1941, 35, 193-200.

39. Frenkel-Brunswick, Else. Intolerance of ambiguity as an emotional and perceptual variable. Journal of Personality, 1949, 18, 108-43.

40. Gardner, J. Wonder. National Education Association Journal, 1959, 46, 73-4.

41. Gatto, F. M. Pupils' questions - their nature and their relationship to the study process. University of Pittsburgh Bulletin, 1929, 26, 65-71.

42. Gerwitz, J. L. Three determinants of attention-seeking in young children. Monograph of the Society for Research in Child Development, 19 (2), 1954.

43. Getzels, J. W. and Jackson, P. W. Creativity and Intelligence. New York: John Wiley and Sons, 1962.

44. Glickman, S. E. Effects of peripheral blindness on the exploratory behaviour in the hooded rat. Canadian Journal of Psychology, 1958, 12, 45-51.

45. Good, C. V. and Scates, D. E. Methods of Research: Educational, Psychological, Sociological. New York: Appleton-Century-Crofts, 1954.

46. Hammond, S. B. Curiosity and creativity. Journal of Engineering Education, 1958, 48, 392-3.

47. Harlow, H. F. Mice, monkeys, men and motives. Psychological Review, 1953, 60, 23-32.

48. ________ and McClearn, G. E. Object discriminations learned by monkeys on the basis of manipulation motives. Journal of Comparative and Physiological Psychology, 1954, 47, 73-6.

49. Hasbrouch, P. D. Enquiring eddies. Progressive Education, 1935, 12, 267-9.

50. Hinde, R. A. Factors governing the changes in strength of a partially inborn response as shown by the mobbing behaviour of the Chaffinch. Proceedings of the Royal Society of London, Series B, 1954, 142, 306-331.

51. Inhelder, Barbel and Piaget, J. De la Logique de l'Enfant a' la Logique de l'Adolescent. Paris: Presses Universtaires de France, 1956.

52. Jersild, A. T. and Tasch, Ruth J. Children's Interests and What They Suggest for Education. New York: Teachers College, Columbia University, 1949.

53. Josselyn, Irene M. The Happy Child. New York: Random House, 1955.

54. Kagan, J. et al. Personality and IQ change. Journal of Abnormal and Social Psychology, 1958, 56, 261-66.

55. Kirkendall, L. A. The influence of certain incentives in the motivation of children. *Elementary School Journal*, 1938, 38, 417-24.

56. Kish, G. B. and Antonitis, J. J. Unconditional operant behavior in two homozygous strains of mice. *Journal of Genetic Psychology*, 1956, 88, 121-24.

57. Lehman, H. C. and Witty, P. A. *The Psychology of Play Activities*. New York: Barnes, 1927.

58. Leuba, C. A new look at curiosity and creative activity. *Journal of Higher Education*, 1958, 29, 132-40.

59. ________. Toward some integration of learning theories: the concept of optimal stimulation. *Psychological Reports*, 1955, 1, 27-33.

60. Lombard, Ellen C. Our adventures with children: developing an inquiring mind. *School Life*, 1940, 26, 71-2.

61. Lorenz, K. Plays and vacuum activities. In *L'Instinct dans le Comportement de l'Animal et de l'Homme*. Paris: Masson et Cie, 1956.

62. Maslow, A. H. A theory of human motivation. *Psychological Review*, 1943, 50, 310-96.

63, Masson-Oursel, P. Etre curieux. *La Psychologie et la Vie*, 1929, 3, 110-12.

64. Maw, W. H. and Maw, Ethel W. Children's curiosity as an aspect of reading comprehension. *The Reading Teacher*, 1962, 15, 236-40.

65. ________________. Establishing criteria for evaluating measures of curiosity. *Journal of Experimental Education*, 1961, 29, 299-306.

66. ______________. Information recognition by children with high and low curiosity, *Educational Research Bulletin*, 1961, 40, 197-201+.

67. ______________. Nonhomeostatic experiences as stimuli of children with high curiosity, *California Journal of Educational Research*, 1961, 12, 57-61.

68. ______________. The relationship between curiosity and scores on a test of general information. *Journal of the Association for Research in Growth Relationships*, 1960, 2, 27-33.

69. McClearn, G. E. The genetics of mouse behavior in novel situations. *Journal of Comparative and Physiological Psychology*, 1959, 52, 62-67.

70. McDougall, W. *An Introduction to Social Psychology*. London: Methuen, 1908.

71. McReynolds, P. et al. Relation of object curiosity to psychological adjustment of children. *Child Development*, 1961, 32, 393-400.

72. Menaker, W. Neugier in 1. und 2. lebenjahr. *Zeitschrift für Psychologie*, 1936, 137, 131-67.

73. Miles, R. C. Learning in kittens with manipulatory, exploratory, and food incentives. *Journal of Comparative and Physiological Psychology*, 1958, 51, 39-42.

74. Monroe, P. *A Cyclopedia of Education*. New York: Macmillan Co., 1911.

75. Montgomery, K. C. The effect of activity deprivation upon exploratory behavior. *Journal of Comparative and Physiological Psychology*, 1953, 46, 438-41.

76. ____________. The relation between fear induced by novel stimulation and exploratory behavior. *Journal of Comparative and Physiological Psychology*, 1955, 48, 132-36.

77. ____________and Monkman, J. A. The relation between fear and exploratory behavior. *Journal of Comparative and Physiological Psychology*, 1955, 45, 132-36.

78. ____________and Zimbardo, P. G. Effects of sensory and behavioral deprivation upon exploratory behavior of rats. *Perceptual Motor Skills*, 1957, 7, 223-29.

79. Morse, W. C. and Wingo, C. M. *Psychology and Teaching*, Chicago: Scott, Foresman and Co., 1955.

80. Morton, J. A. A study of children's mathematical interest questions as a clue to grade placement of arithmetic topics. *Journal of Educational Psychology*, 1946, 37, 438-39.

81. Mote, F. A. and Finger, F. W. Exploratory drive and secondary reinforcement in the acquisition and extinction of a simple running response. *Journal of Experimental Psychology*, 1952, 44, 292-300.

82. Muller, H. J. Human values in relation to evolution. *Science*, 1958, 127, 625-29.

83. Murphy, G. *Human Potentialities*. New York: Basic Books, 1958.

84. Nissen, H. W. A study of exploratory behavior in the white rat by means of the obstruction method. *Journal of Genetic Psychology*, 1936, 37, 361-76.

85. ____________. Phylogenetic comparison. In Stevens, S. S. (editor) *Handbook of Experimental Psychology*. New York: John Wiley and Sons, 1951.

86. Nunberg, H. *Curiosity*. New York: International Universities Press, 1961.

87. Olds, J. *The Growth and Structure of Motives*. Glencoe, Illinois: The Free Press, 1956.

88. Olnick, S. C. Questioning and pain, truth, and negation. *Journal of the American Psychoanalytic Association*, 1957, 5, 302-24.

89. Osgood, C. E. *Methods and Theory in Experimental Psychology*. New York: Oxford Universities Press, 1953.

90. Oswald, F. W. Obstacles to the development of intellectual curiosity. *Clearing House*, 1932, 6, 349-51.

91. Patrick, Catherine. *What Is Creative Thinking?* New York: Philosophical Library, Inc., 1955.

92. Pavlov, I. P. *Conditional Reflexes*. Oxford: Clarendon Press, 1927.

93. Piaget, J. *Le Développement des Perceptions*. Paris: Presses Universitaires, 1960.

94. __________. *The Origins of Intelligence in Children*. New York: International Universities Press, 1952.

95. Punke, H. H. Curiosity of youth and the future of science. *Junior College Journal*, 1952, 22, 430-7.

96. Roe, Anne. The psychology of the scientist. *Science*, 1961, 134, 456-58.

97. Roosevelt, Eleanor. In defense of curiosity. *Saturday Evening Post*, 1935, 208, 8+.

98. Sartain, A. Q. et al. *Psychology: Understanding Human Behavior*. New York: McGraw-Hill Book Co., 1958.

99. Sherwood, G. H. How, when, and why? *Child Study*, 1933, 11, 65.

100. Shoenfeld, D. D. Curiosity as a symptom. *Child Study*, 1933, 11, 73-4.

101. Siebert, H. Beitrag zur Bestiminung der Interessenrichtung von Schülern auf Grund von Schülerfragen, *Archiv für die Gesamte Psychologie*, 1928, 64, 93-124.

102. Siegel, S. *Nonparametric Statistics for Behavioral Sciences*. New York: McGraw-Hill Book Co., 1956.

103. Skinner, B. F. *Science and Human Behavior*. New York: The Macmillan Co., 1953.

104. Smith, Madorah E. The influence of age, sex, and situation on the frequency, form, and function of questions asked by pre-school children. *Child Development*, 1933, 4, 201-13.

105. Sullwald, F. Ein Beitrag zur Analyse der Aufmerks amkeit. *Zeitschrift für Experimentelle und Angevante Psychologie*, 1954, 2, 495-513.

106. Thiessen, D. D. and McGaugh, J. L. Conflict and curiosity in the rat. Paper read to Western Psychological Association. Monterey, California, 1958.

107. Thompson, W. R. and Heron, W. The effect of early restriction on activity of dogs. *Journal of Comparative and Physiological Psychology*, 1954, 47, 77-82.

108. __________ and Heron, W. The effects of restricting early experience on the problem-solving capacity of dogs. *Canadian Journal of Psychology*, 1954, 8, 17-31.

109. ____________ and Higgins, W. H. Emotions and organized behavior: experimental data bearing on the Leeper-Young Controversy. *Canadian Journal of Psychology*, 1958, 12, 61-68.

110. ____________ and Zahn, A. Retroactive effects in the exploratory activity of "bright" and "dull" rats. *Canadian Journal of Psychology*, 1955, 9, 173-82.

111. ____________ and Solomon, L. M. Spontaneous pattern discrimination in the rat. *Journal of Comparative and Physiological Psychology*, 1954, 47, 104-7.

112. Thomson, Helen, Self-confidence has to be built in. *Parents Magazine*, 1957, 32, 48-9+.

113. Thorndike, E. L. and Lorge I. *The Teacher's Word Book of 30,000 Words*. New York: Teacher's College, Columbia University, 1944.

114. Tolman, E. C. *Purposive Behavior in Animals and Man*. New York: Appleton-Century-Crofts, 1932.

115. Torrance, E. P. *Guiding Creative Talent*. Englewood Cliffs: Prentice-Hall, Inc., 1962.

116. Travers, R. M. W. et al. *Some Conditions Affecting Quality, Consistency, and Predictability of Performance in Solving Complex Problems*. San Antonio, Texas: Lackland Air Force Base, 1955.

117. Trevelyn, G. M. *English Social History*. London: Longmans, Green and Co., 1942.

118. Tuttle, H. S. *A Social Basis of Education*. New York: Thomas Y. Crowell, 1934.

119. Vinacke, W. E. *The Psychology of Thinking*. New York: McGraw-Hill Book Co., 1952.

120. Walker, E. L. Action decrement and its relation to learning. *Psychological Review*, 1958, 65, 129-42.

121. Walker, Helen M. and Lev, J. *Statistical Inference*. New York: Henry Holt and Co., 1953.

122. Welker, W. I. Escape, exploratory, and food-seeking responses of rats in a novel situation. *Journal of Comparative and Physiological Psychology*, 1959, 52, 106-111.

123. ________. Some determinants of play and exploration in chimpanzees. *Journal of Comparative and Physiological Psychology*, 1956, 49, 84-89.

124. ________. "Free" versus "forced" exploration of a novel situation by rats. *Psychological Reports*, 1957, 3, 95-108.

125. Wertheimer, M. *Productive Thinking*. New York: Harper and Brothers, 1945.

126. Witty, P. A. The major mysteries. *National Parent Teacher*, 1941, 35, 11-14.

127. Woodcock, L. P. Answering children's questions. Parents Magazine, 1944, 19, 30-1+.

128. Woodworth, R. S. Dynamics of Behavior. New York: Henry Holt and Co., 1958.

129. Zimbardo, P. G. and Montgomery, K. C. Effects of "free environment" rearing upon exploratory behavior. Psychological Reports, 1957, 3, 589-94.

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APPENDIX A

Instruments Used to Establish

Criterion Groups

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TEACHER APPRAISAL OF CURIOSITY

In terms of the description given below, will you please rate your pupils in the follow manner:

1. Write the name of the child you consider to have the most curiosity on the first line.

2. Next, write the name of the child you consider to have the least curiosity on the line corresponding to the number of pupils in your class.

3. Next, write the name of the child you would rank second in curiosity on line 2.

4. Then write the name of the child you consider to have next to the least curiosity on the line above the name of the child having the least curiosity.

5. Continue ranking in this manner until you have ranked all of the children in your class.

DEFINITION OF CURIOSITY: A child may be said to have curiosity to the extent that he:

1. Scans his surroundings looking for new experiences. (For example, if there is something new in the room, he notices it.)

2. Moves toward new, mysterious, or incongruous elements in his environment, either physically or psychologically. (For example, he approaches and/or asks questions about a strange object found on the play ground.)

3. Examines, explores, and/or manipulates new, mysterious or incongruous elements in his environment, either physically or psychologically. (For example, he looks at and/or handles, studies, asks questions about, reads about, discusses a remote-control doll another child has brought to school.)

4. Persists in such examinations, explorations, and/or manipulations. (For example, keeps studying about the remote-control doll until he understands how it works.)

All of these may not be observable in any one child. It is reasonable to suppose that the more of these kinds of behavior a child shows, the more curious he is. The child who shows the most curiosity may or may not be the one who is making the best classroom adjustment.

TEACHER APPRAISAL OF CURIOSITY

School____________________ Grade________ Teacher's Name____________

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
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44. ____________________
45. ____________________
46. ____________________
47. ____________________
48. ____________________
49. ____________________
50. ____________________

Name____________________ School________________________ Date__________

Room____________________

WHO SHOULD PLAY THE PART?

Let us pretend that we are going to give a play. The play will be judged with plays given by other classes in the school. The highest score will be given to those plays where the people playing the parts are really behaving as they usually do anyway. For example, if the character were a baseball player, the part should be played by the best ball player in your room even if you did not like him at all. If the part required a girl who was active in the Girl Scouts, you would have a better chance of having your room win the contest if you selected a girl who was a scout leader even if you never played with her yourself.

Our play will require eight people. A small description of each part is given below. Please write in the space provided the name of a classmate who is most like the description. If you think you are the person write in your own name. If you think two members of your class show equally well in their daily behavior the role described, write in both names. Do not use a name more than once.

Part 1. This part will be played by a classmate who keeps working for a long time trying to understand anything new which can be examined. This pupil sticks to problems trying to solve them. This member of the class is the last to give up when the class is looking for answers to questions. This pupil keeps asking questions after everyone else has stopped and will remain working on strange things after others are gone. This pupil often takes things apart but will work a long time to put them together to find out how they work. ____________________

____

Part 2. This part will be played by a pupil who is always eager to examine new things and considers them in different ways. This pupil is willing to try new games and is often called nosy, but this classmate has more experiences to tell about than anyone else. __________

____

Part 3. This part will be played by a pupil who always rushes toward new and strange things. This pupil is always asking questions and begs the teacher for permission to look at things that are new and different. This classmate often gets into trouble for rushing to the door when strangers come and for running to the window when something is happening outside. No matter what is going on this pupil seems to ask more questions than other members of the class. ______________________________

____

Part 4. This part will be played by a pupil who seems to watch everything that is going on. This pupil seems to see everything and is the first to notice anything strange or new. Often this pupil seems to be looking around at things which other class members hardly notice.

____

Part 5. This part will be played by a pupil who doesn't get interested when someone brings a new puzzle to class. If someone has something strange or queer this pupil does not pay much attention to it. This pupil never takes things apart to see how they are made. This classmate wants to change what he is doing very often or to abandon any task that seems hard. ____________

____

Part 6. This part will be played by a pupil who guesses about things instead of looking at them closely. Even when looking at things this pupil misses important parts of it. Instead of trying new things, this classmate seems to be trying to escape them. Some people think this pupil is shy for hesitating so often to examine and explore things. In telling about things, this classmate often neglects to tell importent parts of the story.

____

Part 7. This part will be played by a pupil who seems to avoid asking questions. When something new or strange happens this classmate seems to withdraw from it. This member of the class loses interest very quickly and refuses to rush into new things. When something new is brought into the classroom, this pupil is usually standing in back of the others who are looking at it and is the first to leave a group where someone is showing something new. This classmate often pokes fun at things because they are different. ____________

____

Part 8. This part will be played by a pupil who misses seeing the things that other members of the class see easily. Even when doing very little this pupil is not easily disturbed by things that happen in the classroom. When something new or strange is brought into the classroom this classmate often does not look at it or just gives it a slight glance. ______________________________

____

Name ______ ____________School____________________Date__________

Room____________

ABOUT MYSELF

This is a study of some of your habits and attitudes. There is no right or wrong answer for any statement. The best answer is what you feel is true of yourself. For each statement mark X before the word which tells how true it is of yourself.

1. I like to explore strange places.

____Never ____Sometimes ____Often ____Always

2. If a grown-up says something, I believe it.

____Never ____Sometimes ____Often ____Always

3. When I see a neighbor digging in his yard, I wonder what he is doing.

_____Never ____Sometimes ____Often ____Always

4. When someone talks about strange things, I want to know more about them.

_____Never ____Somethimes ____Often _____Always

5. I question things that I read or see.

____Never ____Sometimes ____Often ____Always

6. When there is something new in the room, I notice it right away.

_____Never ____Sometimes ____Often _____Always

7. I like to find out how things work.

______Never ____Sometimes ____Often _____Always

8. I make up my mind very quickly.

______Never ____Sometimes ____Often _____Always

9. I keep my hands clean.

______Never ____Sometimes ____Often _____Always

10. I keep away from strange and unusual things.

_____Never ____Sometimes ___Often ______Always

11. I ask questions in school.

_____Never ____Sometimes ____Often ______Always

12. When someone tells something strange, I doubt the truth of it.

____Never ____Sometimes ____Often ____Always

13. When I see a bag or box that I haven't seen before, I peek into it to see what is there.

____Never ____Sometimes ____Often ____Always

14. I take things apart to see how they work.

____Never ____Sometimes ____Often ____Always

15. I believe the things I read in books.

____Never ____Sometimes ____Often ____Always

16. Whenever I see a film, I see things that other people miss.

____Never ____Sometimes ____Often ____Always

17. When I see my neighbors getting into their car, I wonder where they are going.

____Never ____Sometimes ____Often ____Always

18. I find that things puzzle me.

____Never ____Sometimes ____Often ____Always

19. I grow out of my shoes before I wear them out.

____Never ____Sometimes ____Often ____Always

20. I like to find out as much as I can before I make up my mind.

____Never ____Sometimes ____Often ____Always

21. I keep my clothes neat and clean.

____Never ____Sometimes ____Often ____Always

22. When I see something new, I want to know what it is.

____Never ____Sometimes ____Often ____Always

23. After I visit a new place, I like to learn more about it.

____Never ____Sometimes ____Often ____Always

24. When I see people I know going along the street, I wonder where they are going.

____Never ____Sometimes ____Often ____Always

25. I like people who are adventurous.

____Never ____Sometimes Often Always

26. I have a lot of curiosity.

____Never ____Sometimes ____Often ____Always

27. I like to discover new things.

____Never ____Sometimes ____Often ____Always

28. When I see something new, I want to know how much it cost.

____Never ____Sometimes ____Often ____Always

29. I notice things that other people do not see.

____Never ____Sometimes ____Often ____Always

30. I like to look around inside old buildings.

____Never ____Sometimes ____Often ____Always

31. I believe things I hear or see.

____Never ____Sometimes ____Often ____Always

32. I like to play with children who are adventurous.

____Never ____Sometimes ____Often ____Always

33. I ask about things I want to know.

____Never ____Sometimes ____Often ____Always

34. When a new house is being built, I watch the men working and look around for new things.

____Never ____Sometimes ____Often ____Always

35. I take good care of my toys and school supplies.

____Never ____Sometimes ____Often ____Always

36. I think I can be called an adventurous person.

____Never ____Sometimes ____Often ____Always

37. I like to find out how things are made.

____Never ____Sometimes ____Often ____Always

38. When I see a strange machine, I go up to it and look at it.

____Never ____Sometimes ____Often ____Always

39. My parents encourage me to ask questions.

____Never ____Sometimes ____Often ____Always

40. I like to look around the room.

____Never ____Sometimes ____Often ____Always

41. I like to work on puzzles until I solve them.

____Never ____Sometimes ____Often ____Always

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APPENDIX B

Measuring Instruments Developed for the First Preliminary Study

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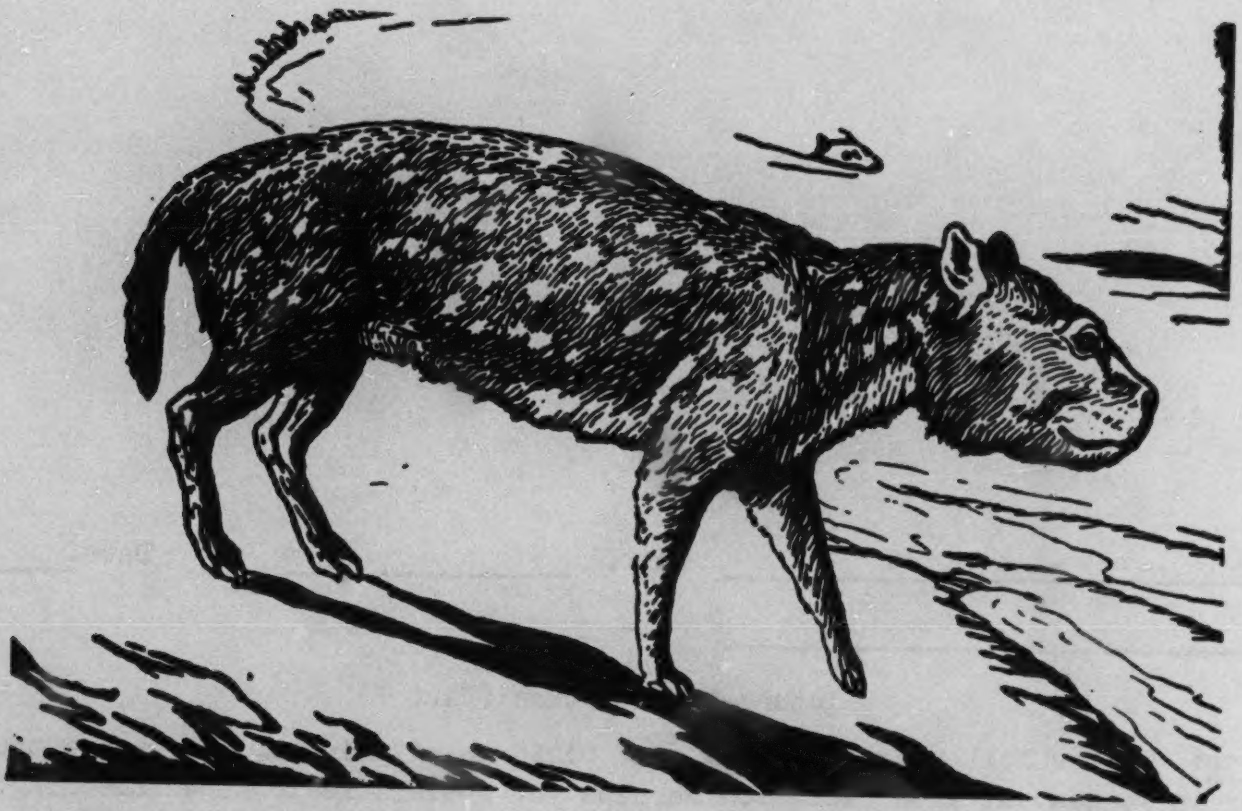
Name ______________________ School ________________ Date __________

Room ______________________

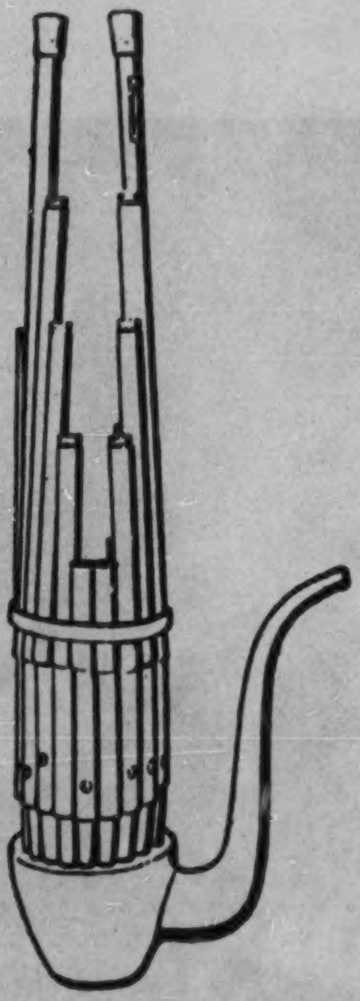
Picture Satisfaction (Part I)

Directions: On the following pages are some pictures of animals, people and things. Something is said about each picture. Perhaps you would like to know something else about each picture. Please write the questions you would like answered below each picture.



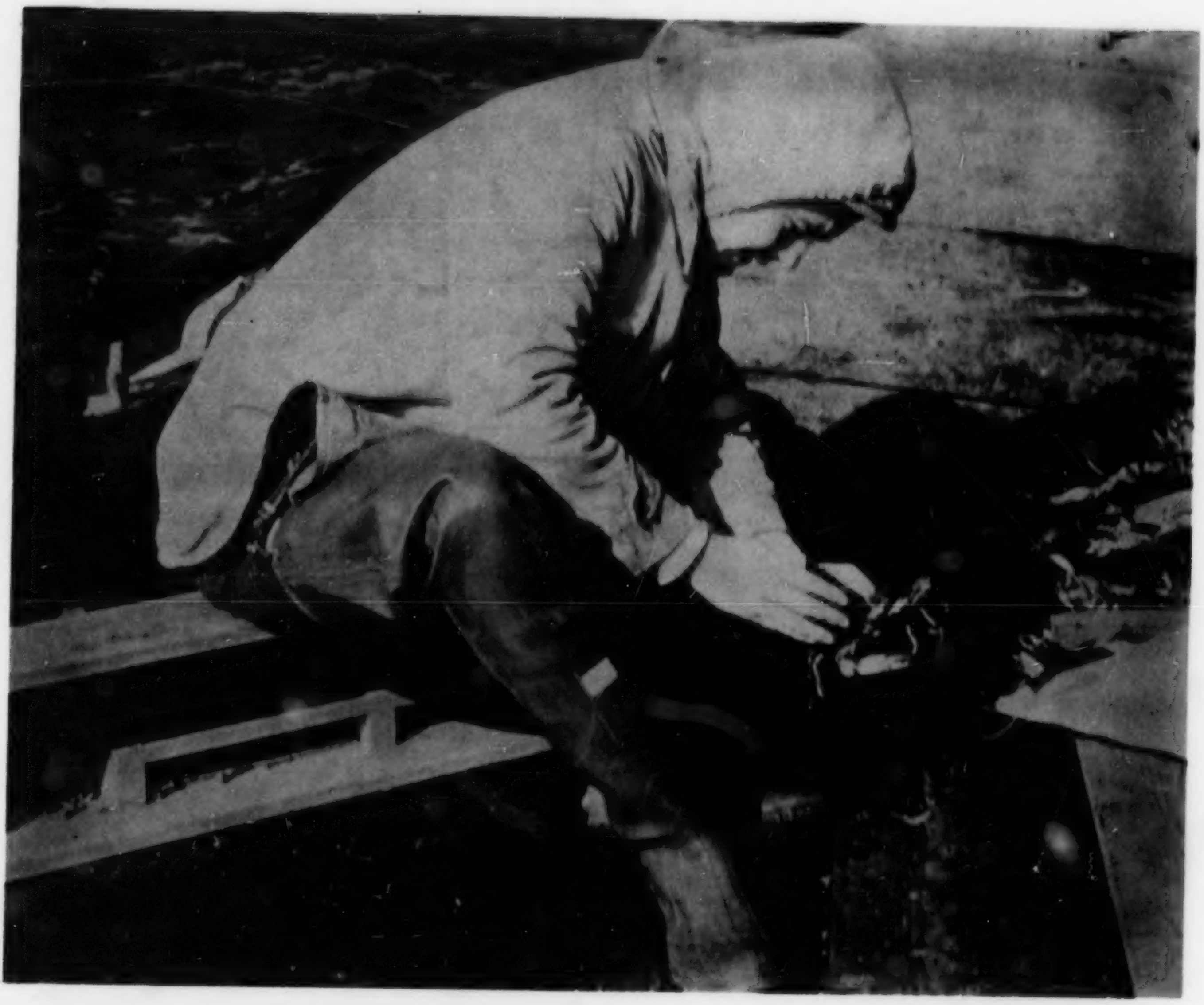
The Oreodont

These animals no longer live on the earth. What else would you like to know about this picture?



Chinese Musical Instrument

This is a picture of a musical instrument that looks like a funny teapot. What else would you like to know about this picture?

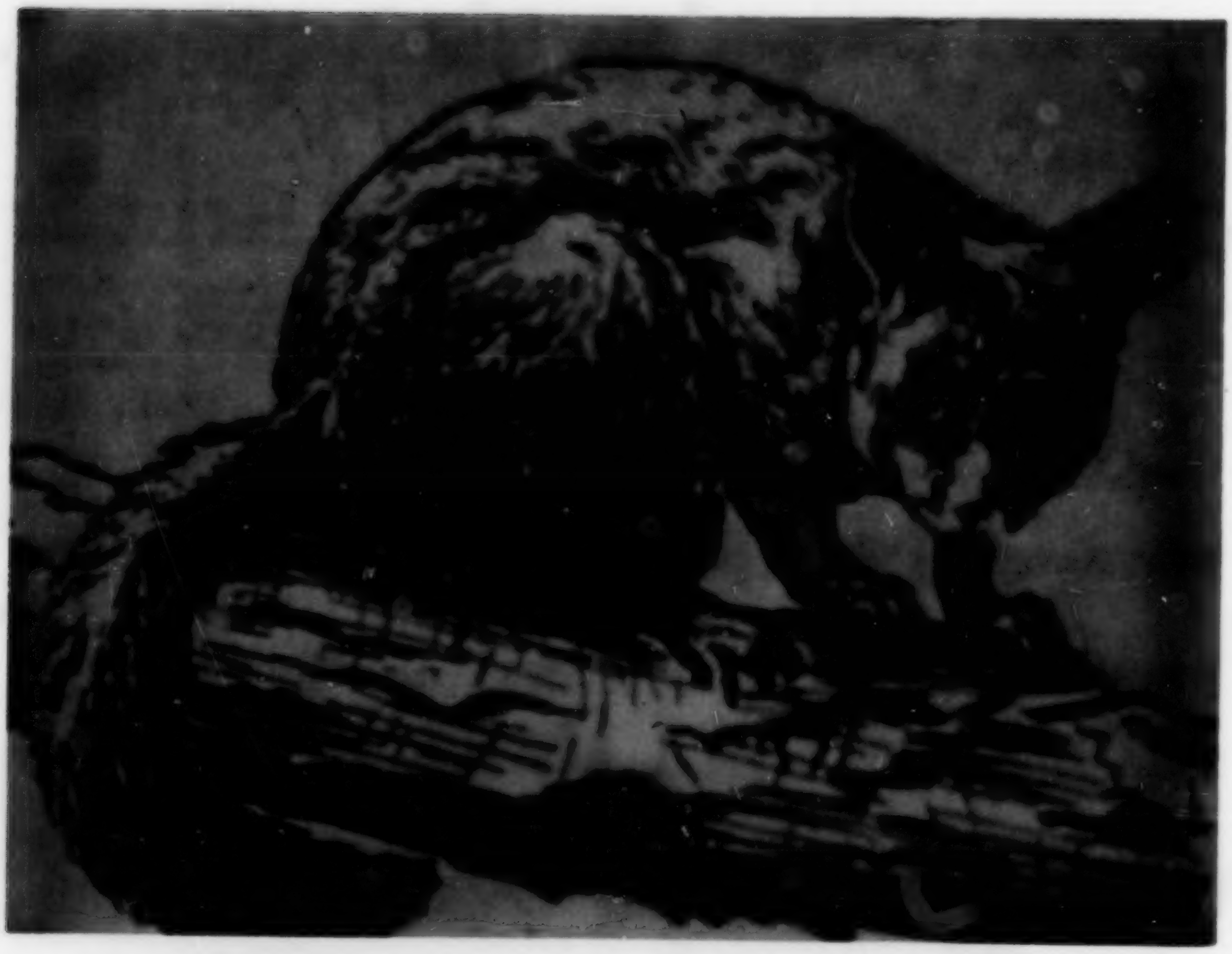


The Scientist

This is a picture of a scientist. What else would you like to know about this picture?

Flying Fox Bat

The flying fox bat is the largest of the bats. What else would you like to know about this picture?



A Phalanger

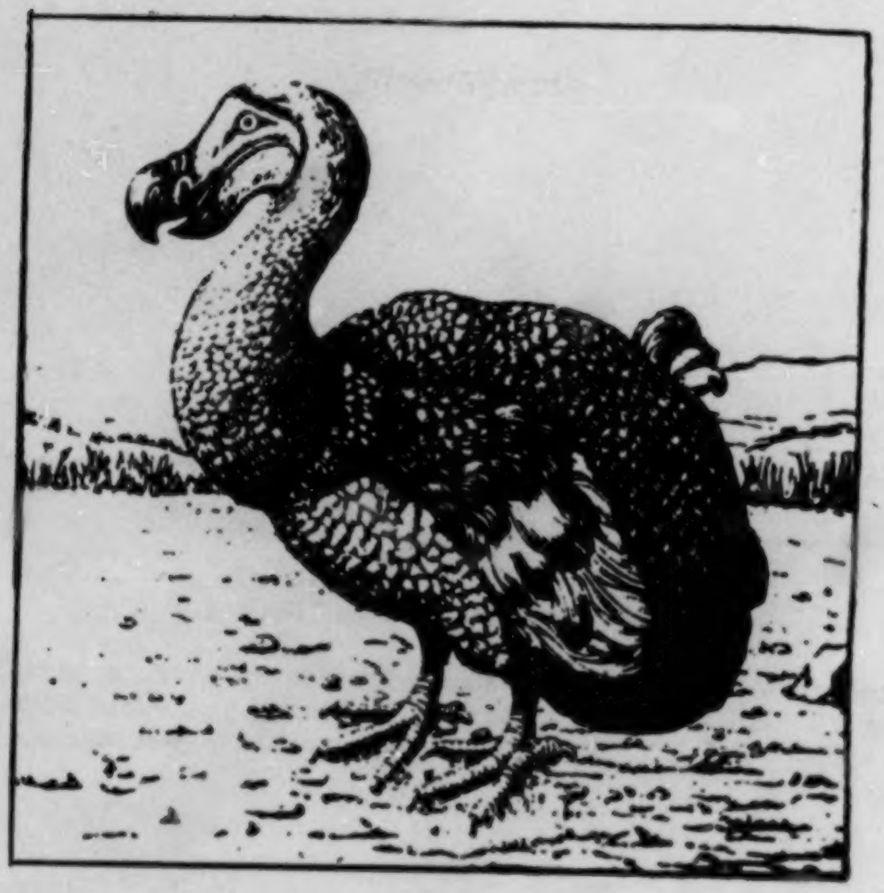
The phalanger belongs to the same family as the kangaroo. What else would you like to know about this picture?

Name ______________________ School ________________ Date ________

Room ______________________

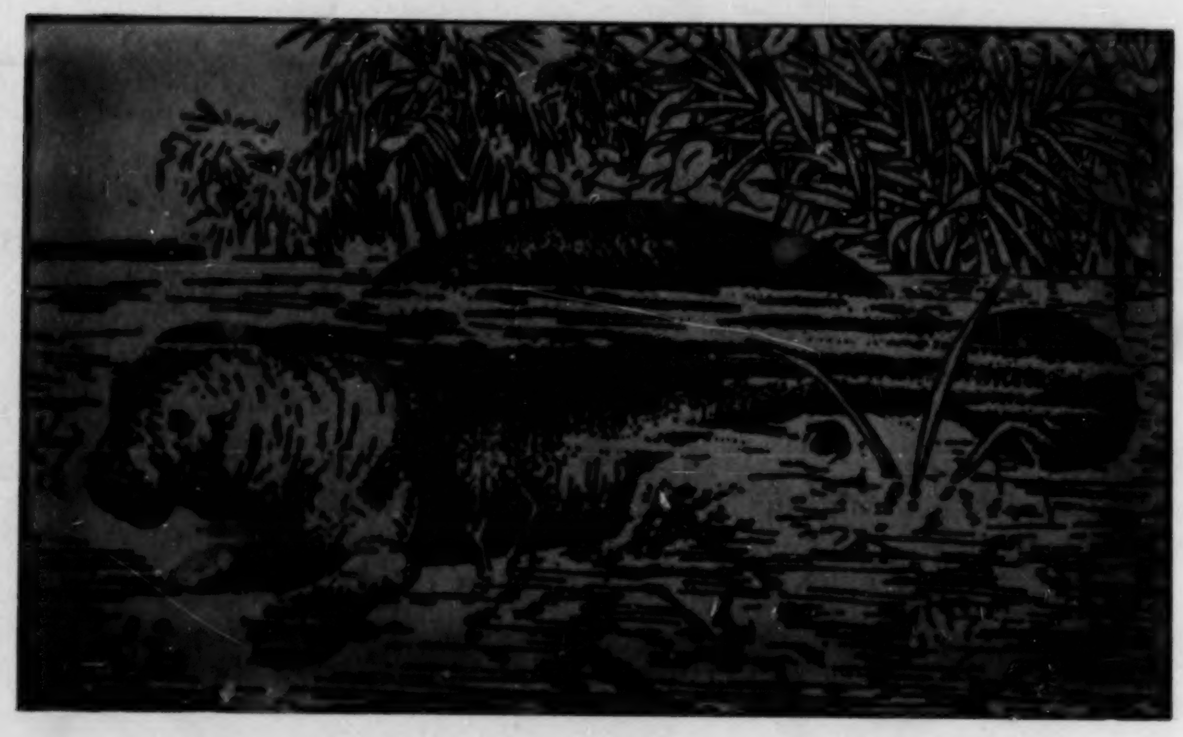
Picture Satisfaction (Part II)

Directions: On the following pages are some pictures of strange animals, people and things. Something is said about each picture. Perhaps you would like to know something else about each picture. Please write the questions you would like answered below each picture.



The Dodo

This bird no longer exists. What else would you like to know about this picture?



The Manatee

The manatee is a clumsy-looking animal. What else would you like to know about this picture?

Name ____________________ School ____________________ Date __________

Room ______________

STORY SATISFACTION

Directions: Read the following stories and answer the questions for each.

1

One day a British soldier was riding along the rim of a hot, dry valley. He saw a hole that looked like the entrance to a cave in the cliff on the opposite side of the valley. He went back to camp and got a group of men to go with him to see what he had found.

After much digging, the soldiers found that there were many caves. The caves had been cut into the rock of the cliff. Some of them contained beautiful pictures and statues. They had been buried for hundreds of years.

DID YOU LIKE THIS STORY ? YES NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY?

2

Steve and Mary were visiting a strange land. Their father took them to a park. In the park there was an iron post as tall as a flag pole. They were surprised to learn that the iron post had been standing for more than 1500 years.

DID YOU LIKE THIS STORY YES NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY?

3

It was a dark night and the train was moving at seventy miles an hour. The engineer was keeping track of where he was by counting the signal lights. He did not know that some of the lights had been shot out. Suddenly he came to a sharp bend and he knew that something was wrong.

DID YOU LIKE THIS STORY?   YES   NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY?

4

Alice went to visit her grandfather who lives in Colorado. Grandfather showed her a pan that had been used to find gold in some of the streams that flowed through the area. Alice asked if she could borrow the pan. Grandfather agreed. Alice went to a mountain stream that ran through Grandfather's land. She panned for gold and had a good time.

DID YOU LIKE THIS STORY? YES NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY

5

In India they recently found some cities that are more than 5000 years old. The cities had been buried for a very long time. The streets were straight and most of the houses had inside baths.

DID YOU LIKE THE STORY YES NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THE STORY?

6

Ann and Fred were going to see their grandmother who lived in Scotland. They flew from New York City to Prestwick, Scotland. When they boarded their plane for the flight, they found that there were only four other passengers. It was a beautiful trip because the stars were bright and they awoke to a lovely sunrise.

DID YOU LIKE THIS STORY? YES NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY?

Name ____________________ School ____________________ Date ____________

Room ______

Story Satisfaction (Form II)

In the following items you should ask everything you want to know about each story.

1

John and Betty were living in a strange land. One day as they were walking home they came suddenly upon a snake. They were very frightened and did not know which way to move because both ends of the snake looked the same. They froze in their tracks, and after what seemed like hours, although it was only a few minutes, the snake crawled away.

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY? Write as many questions as you can. Use the back of this page if necessary.

2

Paul Smith's father was a mountain climber. He liked to go to the top of the highest mountains. One day he took Paul with him. It was hard work climbing to the top. When they got there, they found only bare rocks. It was too cold for trees to grow there. The sky was beautiful and they could see for many miles in all directions.

Suddenly a thunder storm came up. Paul and his father could not get off the top of the mountain before it was upon them.

Mr. Smith shoutod,"Paul ! Lie flat on the rocks and don't even raise your head."

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY? Write as many questions as you can. Use the back of this page if necessary.

Name_____________________School___________________Date________

Boy____________ Girl_________ Room___________

WHAT WOULD YOU DO?

Directions: In each of the questions below, mark the thing you think you would do or would prefer to do if you had to do one of the four. There is no wrong answer. You may prefer to do one thing and someone else may prefer to do something different.

1. If you were a Boy Scout or a Girl Scout, would you prefer to work on:

   _____ a stamp collecting merit badge

   _____ a first aid merit badge

   _____ a pathfinding merit badge

   _____ a safety merit badge?

2. If you were walking across an open field and you found an old golf ball that had been knocked out of shape, would you:

   _____ give it a kick

   _____ throw it away

   _____ cut it up to see how it was made

   _____ play golf with it?

3. If you could play anything you wanted to play, would you pretend you were:

   _____ a general

   _____ an Indian Chief

   _____ an explorer

   _____ a river pilot?

4. If you could have any of the following for your birthday would you select:

   ______an erector set

   ______a Lincoln Log set

   ______a painting set

   ______a microscope?

5. If you had a dollar, would you:

_____ buy a big bag of candy

_____ buy a toy

_____ buy a book

_____ save the money?

6. If you were alone, would you:

_____ dream of what you want to be when you are older

_____ read a funny book

_____ take apart small things like an old alarm clock

_____ take a nap?

7. If someone gave you a new toy, would you:

_____ try to keep it as new as you can

_____ take it apart to see how it is made

_____ put it where you can look at it

_____ play with it until it wears out?

8. If you saw a gang of kids playing a game that you did not know, would you:

_____ pay no attention to them

_____ join the gang and play although you make mistakes

_____ try to learn the rules as fast as you could

_____ tell the gang that the game is no good?

9. If you had a favorite movie star, T.V. star or baseball star, would you:

_______ know his home address

_______ know his family history

_______ know his successes and failures

_______ know all you could about him or her?

10. If on your way to school you saw a strange bird, would you:

_____ forget about it

_____ try to identify it by guessing

_____ try to identify it by comparing it with pictures

_____ ask your teacher what it is?

11. If your family were planning a trip, would you want to:

_____ go where you went last year

_____ go to another place like the place you went last year

_____ stay at home

_____ go to places that you have never heard about?

12. If something you did not understand were mentioned in class would you:

_____ look it up in a book

_____ wait for someone else to report on it

_____ let it go until it comes up again

_____ hope the teacher clears it up?

13. If you were grown up, would you want to be:

_____ a teacher

_____ a clerk in a store

_____ a farmer

_____ a detective?

14. If you could study only one subject, would you select:

_____ arithmetic

_____ reading

_____ spelling

_____ language?

15. If you had an arithmetic problem to work, would you:

_____ prefer to do something else

_____ ignore it altogether

_____ try to solve it at once

_____ get angry at the teacher?

16. If the following programs appeared on different channels at the same time would you select:

_____ a news program

_____ The Best of Groucho

_____ Amos and Andy

_____ This is Adventure?

17. If you found a strange insect, would you:

____step on it

____pay no attention to it

____call others to see it

____watch and see what it will do?

18. If you went to the library to get a book would you select:

____A Child's True Facts About the Moon

____Dale's Dream About His Trip to the Moon

____The Story of the Man in the Moon

____A Book of Poems about the Moon?

19. If you had to do one of the following, which would you select?

____learn a poem by heart

____find answers to questions

____paint pictures for social studies

____work to make a perfect score in spelling?

20. If you had enough money to travel, which would you like to visit first:

____countries in Europe where English is spoken

____cities in Asia

____the upper part of the Congo River in Africa

____countries in Europe where languages other than English is spoken?

21. If you found a secret message, would you:

____look at it and let it go

____consider secret messages foolish

____try to read the message

____copy down the message?

22. If you are given a jig-saw puzzle for Christmas, would you:

____work with it until you put it together

____put some of it together and then give up

____pay no attention to the puzzle

____trade it for another toy?

23. If you were invited to go fishing, would you:

___try to find out before you left home what kind of bait the fish were biting on

___buy some bait from a store

___dig up worms and hope to catch something

___take whatever kind of bait your friend told you to take?

24. If you were out of school, would you want to:
___keep the books in a store

___hunt for new minerals

___work in a library

___serve the passengers on an airplane?

25. If you were to see a strange airplane, would you:
___try to identify it by looking at pictures

___try to think what it is

___forget about it very quickly

___tell your parents what you had seen?

26. If your class were going on a field trip, would you like to go:

___to get out of school

___because you like to go any place

___because you want to find out about things

___in order to talk with your friends?

27. If you were in a room with all kinds of maps, would you look first at maps of:
___your city

___the routes to a nearby city

___the USA

___the ancient world?

28. If you were studying history, you would enjoy most:

___finding out why an event took place

___learning dates

___learning the names of people

___studying for tests?

29. If you were on a trip to a cave with your class would you:

_____want to get out as fast as you could

_____enjoy the company of your classmates

_____keep thinking about how hungry and tired you are

_____try to find out as much as you could about the cave?

30. If you saw a strange round object in the sky, would you:

_____think it was a flying saucer from outer space

_____find out if anyone knew about such objects being in the sky

_____forget you had seen it and go about your own affairs

_____conclude it was a balloon?

31. If you were handed a strange piece of fruit similar to the one a friend of yours was eating, would you:

_____refuse to eat it

_____put it in your pocket

_____give it back to your friend

_____try it?

32. If you heard that there was going to be a shower of falling stars at eleven o'clock in the evening,would you:

_____accept the statement as true

_____forget about it

_____ask your parents about it

_____ask your parents to help you stay up so you could see it?

33. If someone gave you a strange stamp, would you first:

____put it in a book

____throw it away

____examine it for small mistakes in printing

____ask the name of the country from which it came?

34. If you saw someone doing a strange dance, would you:

_____think it was foolish

_____wonder what the dance meant

_____wish you were watching something else

_____enjoy watching it?

35. If you heard a strange noise, would you

_____run away as fast as you could

_____invent a make-believe story about the noise

_____try to find out what caused the noise

_____pretend you didn't hear the noise?

36. If you were going to trap an animal, would you:

_____set your trap where you thought the animal should be

_____watch for signs of the animal before setting a trap

_____first read about the animal in a book

_____set traps at any hole you found?

37. If you were given a puppet, would you:

_____pull the strings to see the legs and arms work

_____spend enough time to learn how to make the parts work well

_____forget about it because the strings get mixed up too easily

_____ask someone to work it for you?

38. If you arrived in the middle of a show, would you:

_____refuse to go in and go somewhere else

_____wait until the next show begins

_____sit through the show until the end and then go home

_____sit through the show and then watch it until it came to the place where you had come in?

39. If you had no paper on which to write, would you:

_____wait until someone came who could give you some

_____start looking to see if you could find some

_____forget about writing at this time

_____dream about doing something else?

40. If you were given a finger printing set, would you:

_____play cops and robbers

_____try to find prints that were left on objects

_____tell your friends about the set

_____show the set to your teacher?

41. If you and your parents did not agree about something, would you:

_____try to make them change their minds

_____think your parents did not like you

_____get angry

_____try to find the facts about the matter?

42. If you were asked how sugar is produced, would you:

_____tell what you know

_____say you do not know

_____ask where the person asking the question thought it came from

_____go to a book and find out?

43. If you saw a cross-word puzzle in the newspaper, would you:

_____turn the page

_____think it was silly

_____try to work it out

_____wait until the next day to see the answers?

44. If you heard a strange sound coming from your back yard, would you:

____wait for the sound to stop

____go to see what was making the noise

____ask your parents what it was

____close the window to keep the sound out?

45. If a new child moved into your neighborhood, would you:

____pay no attention to him

____greet him

____try to find out what he likes to do

____fight with him?

46. If you saw a pile of leaves moving up and down, would you:

____walk away from it

____throw rocks at it

____think the wind was blowing the leaves

____ wait to see what was making it move?

47. If your friend showed you a card trick, would you:

_____ask your friend to show you how to do the trick

_____try to find out for yourself how the trick worked

_____enjoy the trick and then forget it

_____think your friend had a magic power which you did not have ?

48. If you were at the sea shore, would you:

_____catch as many sea creatures as possible

_____make castles in the sand

_____play games in the sand

_____watch the sea creatures to see how they live?

49. If you saw a plant leaning to one side, would you:

_____tie it to a stick to hold it straight

_____find out why the plant was leaning

_____throw the plant out

_____give the plant more water and plant food?

50. In science class would you prefer:

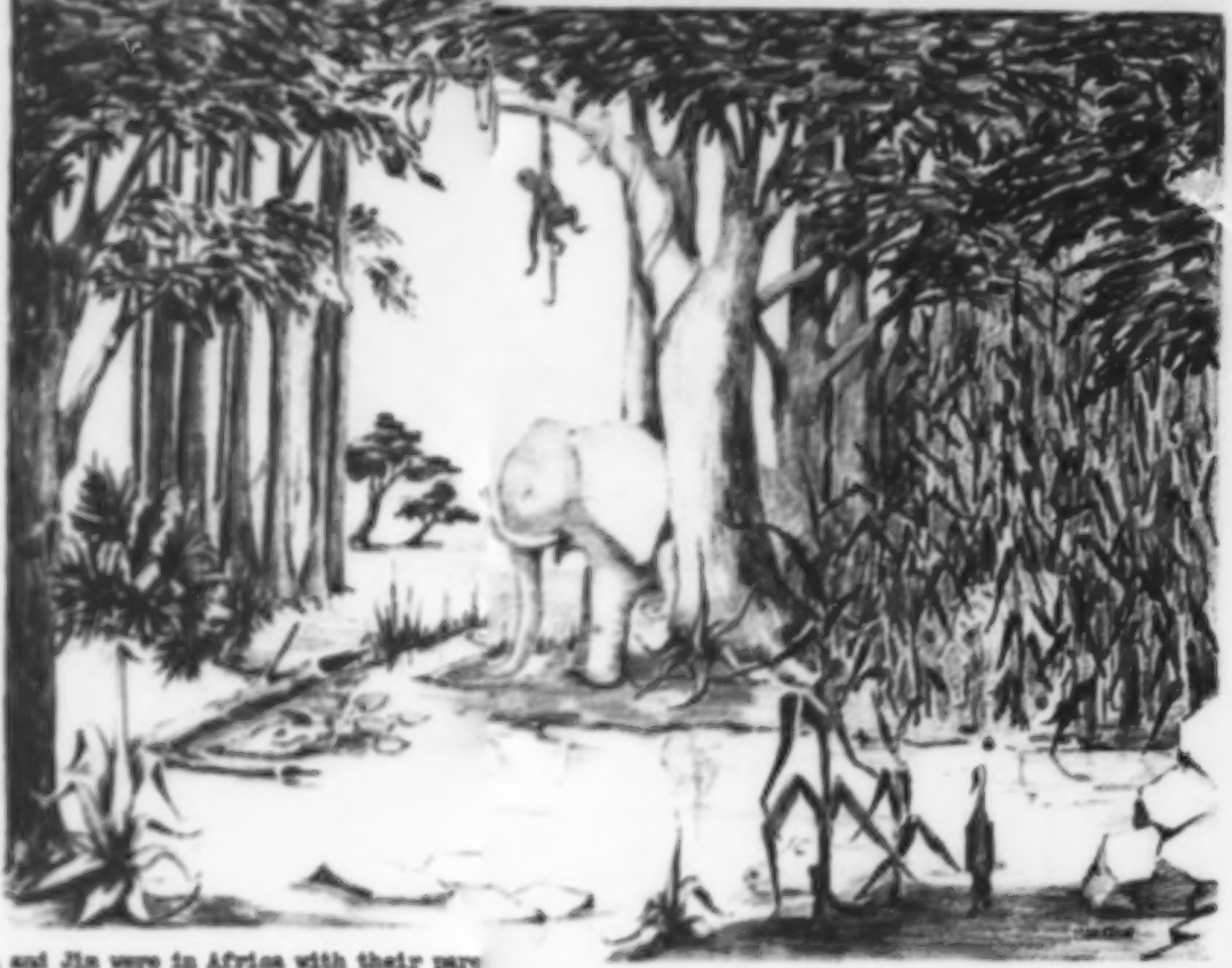
_____to learn to spell the names of animals

_____to give reports on your readings

_____to do experiments to find answers to questions

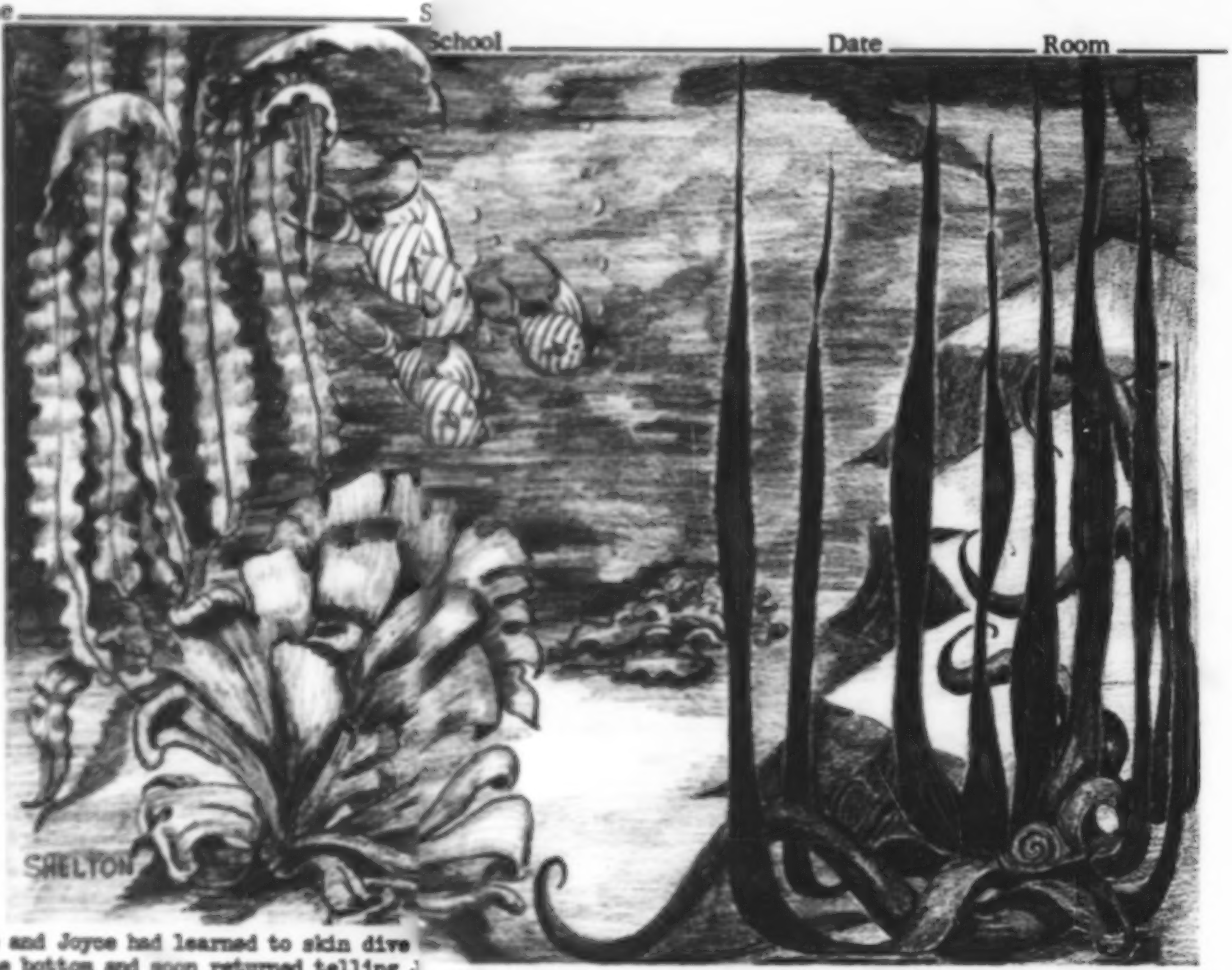
_____to look up answers to questions in your books?

Name ______________________ School ______________________ Date __________ Room ________



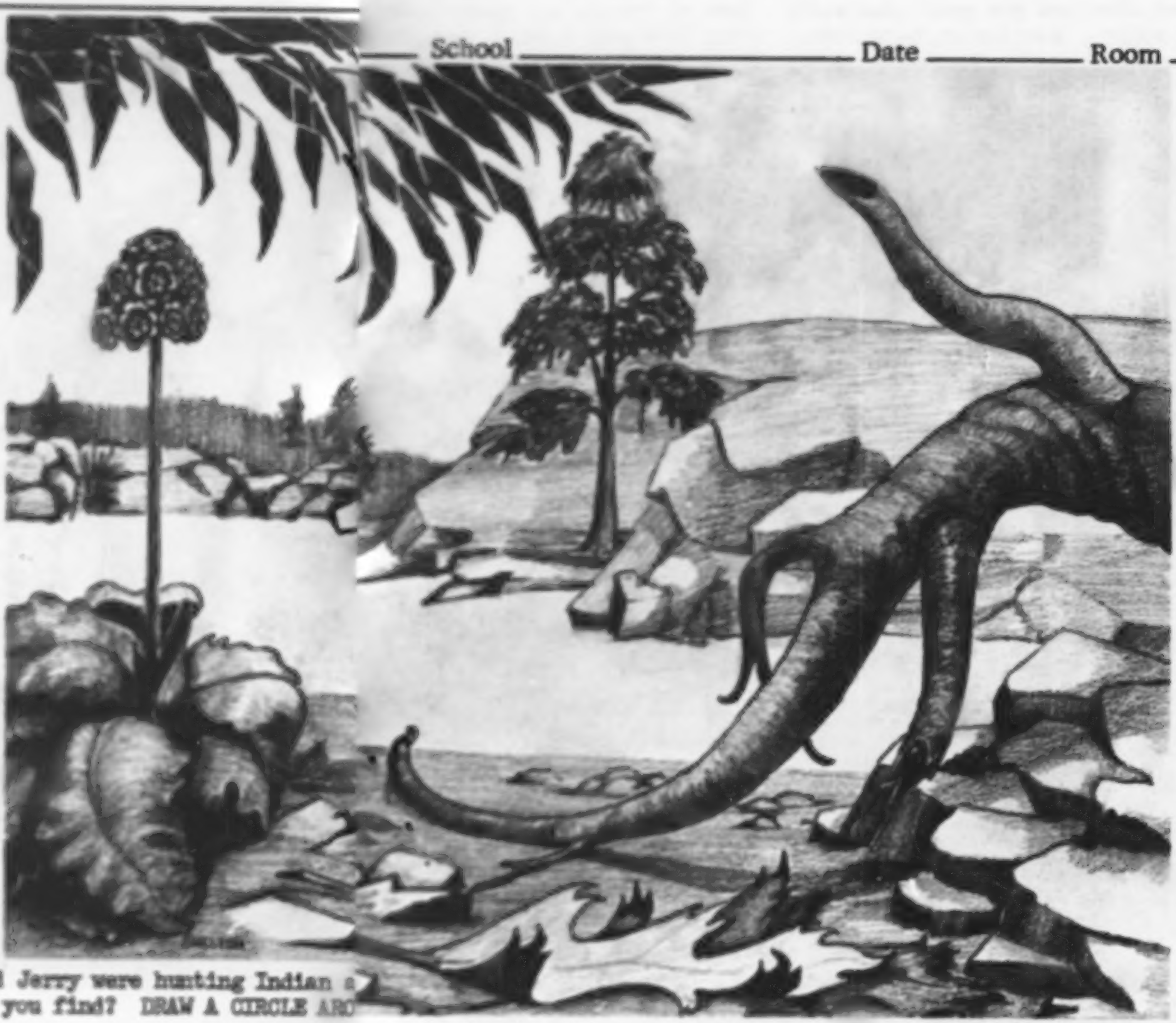
Ann and Jim were in Africa with their parents. Their father hired a boat to take them up a river that ran through a dense jungle. Suddenly Jim cried out, "I can see six wild animals." "I see seven," said Ann. HOW MANY CAN YOU FIND? Draw a circle around each animal.

Name ______________________ School ______________________ Date ____________ Room ________



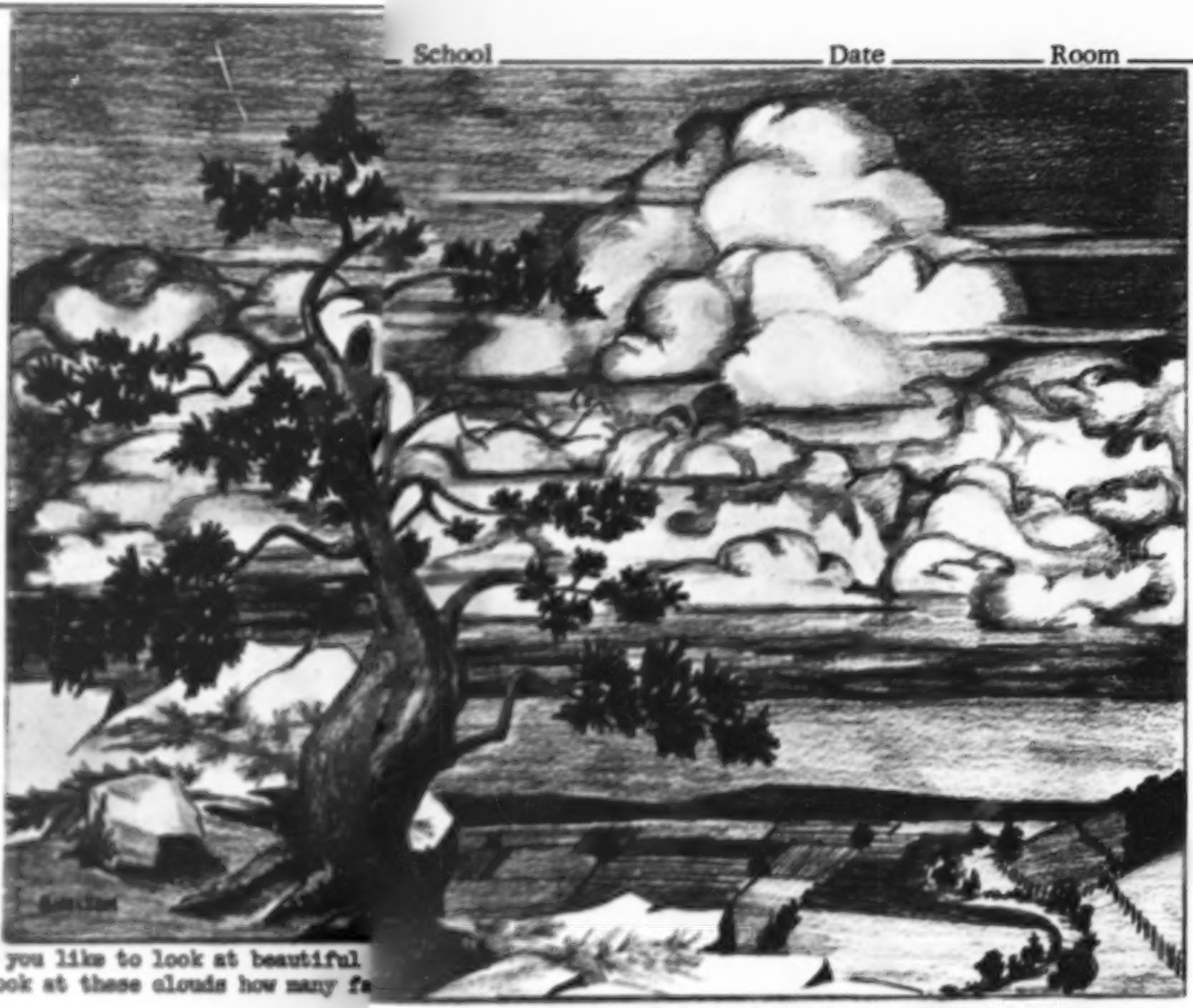
Bruce and Joyce had learned to skin dive and had found a new pool which they wanted to explore. Bruce went to the bottom and soon returned telling Joyce about the animal he saw. Joyce went down and saw many sea animals. DRAW A CIRCLE AROUND ALL THE SEA ANIMALS IN THE PICTURE.

Name ________________ School ________________ Date ________ Room ________



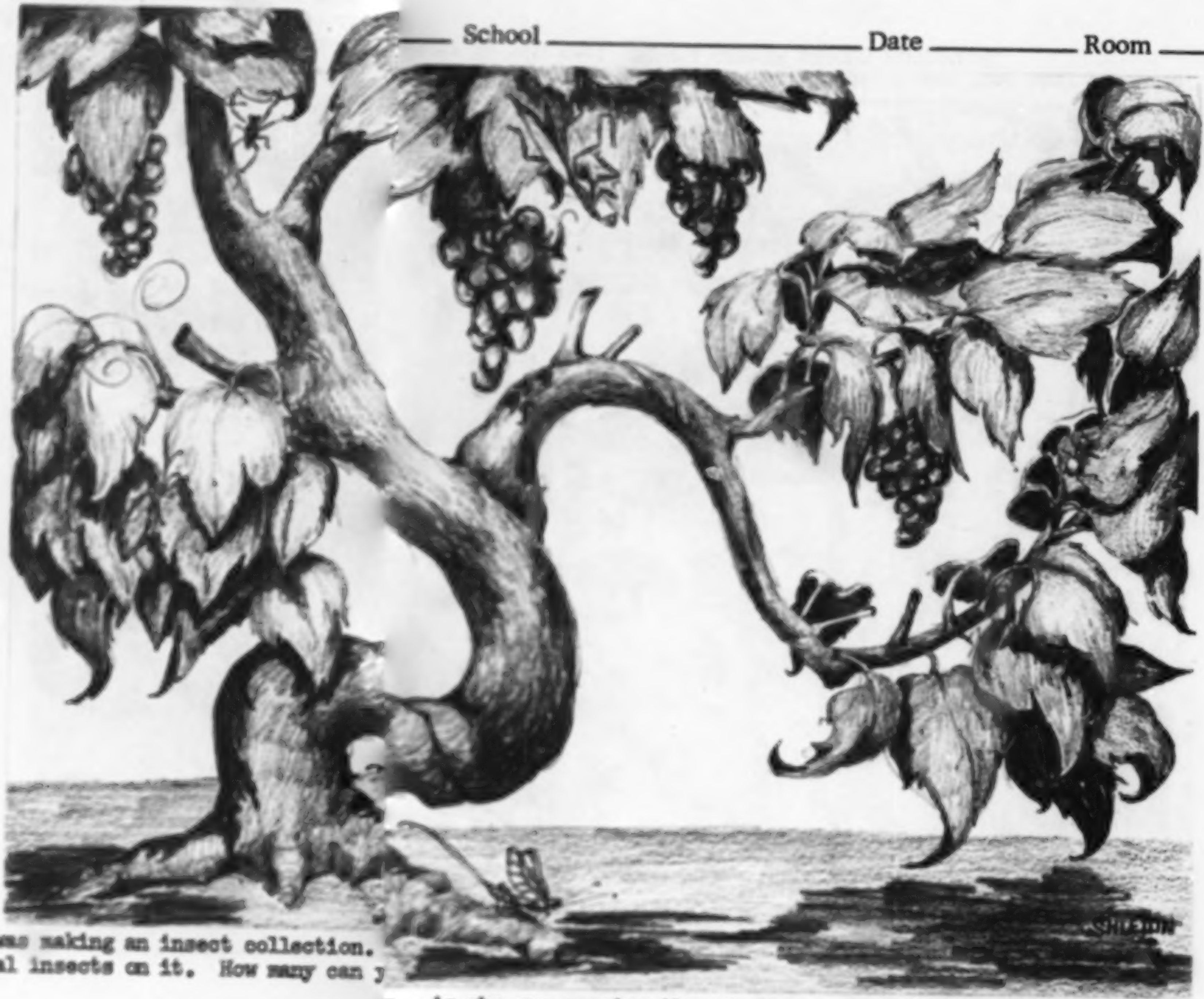
Agnes and Jerry were hunting Indian arrowheads along the creek. Agnes found six and Jerry saw five. How many can you find? DRAW A CIRCLE AROUND EACH ARROWHEAD.

Name ____________ School ____________ Date ____________ Room ____________



Don't you like to look at beautiful l clouds? I do. When I look at clouds, I can find many pictures. When you look at these clouds how many fa faces do you see? DRAW A CIRCLE AROUND EACH FACE.

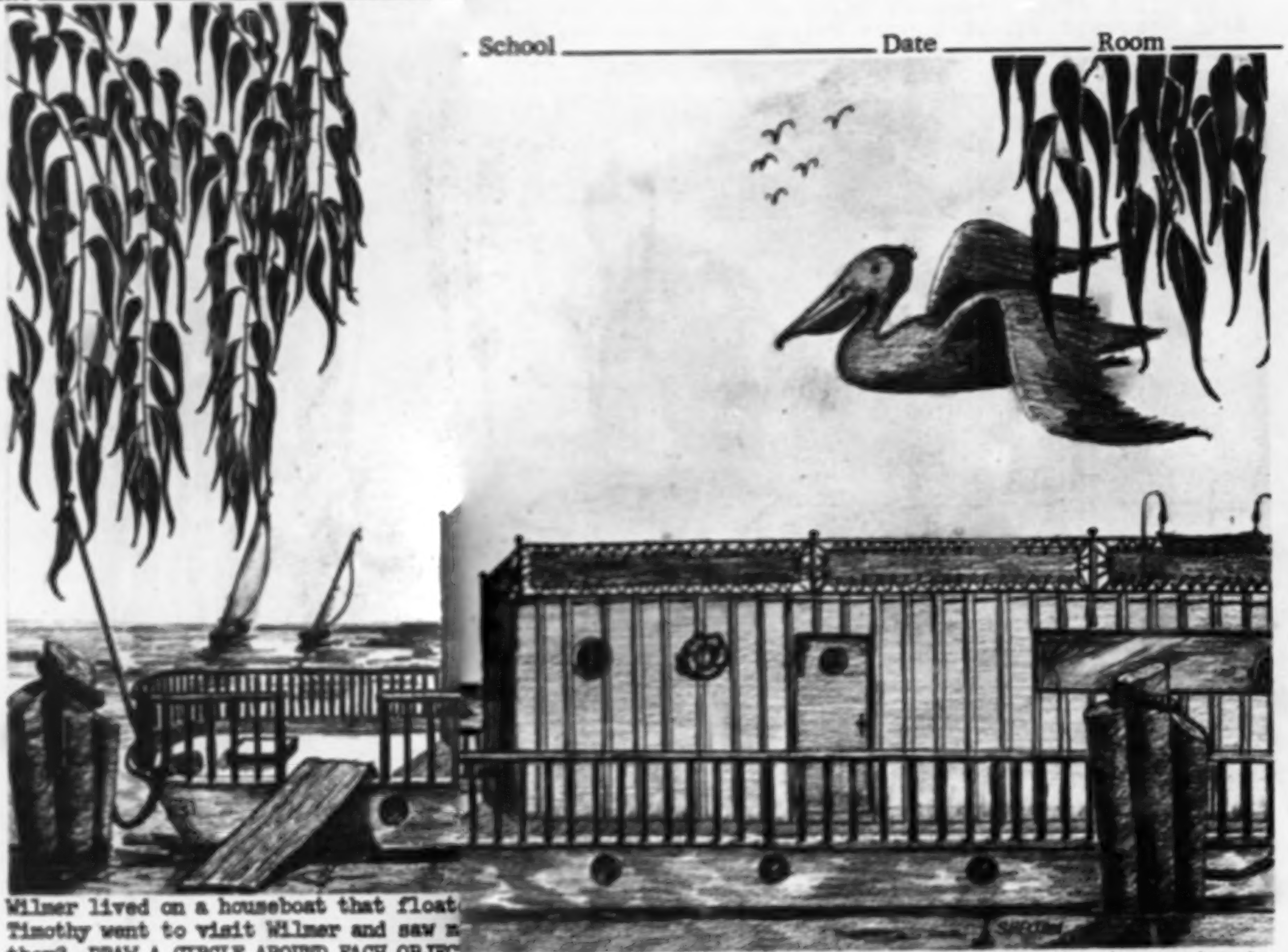
Name ______ School ______ Date ______ Room ______



Mary was making an insect collection. n. As she was running through the woods she came upon a bush and found
several insects on it. How many can y n you find? DRAW A CIRCLE AROUND EACH.

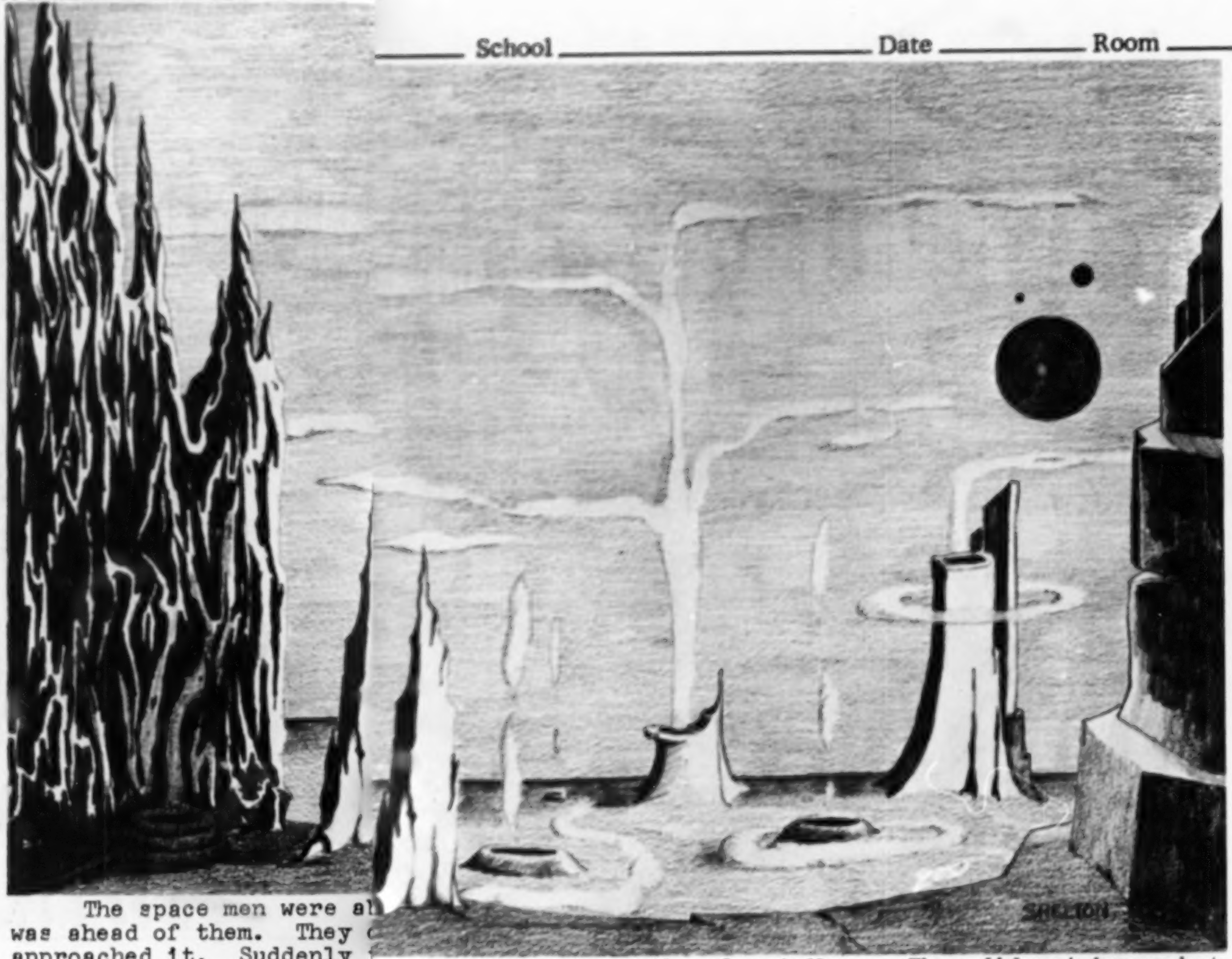
Name ______________________ Sc

School ______________________ Date ____________ Room ____________



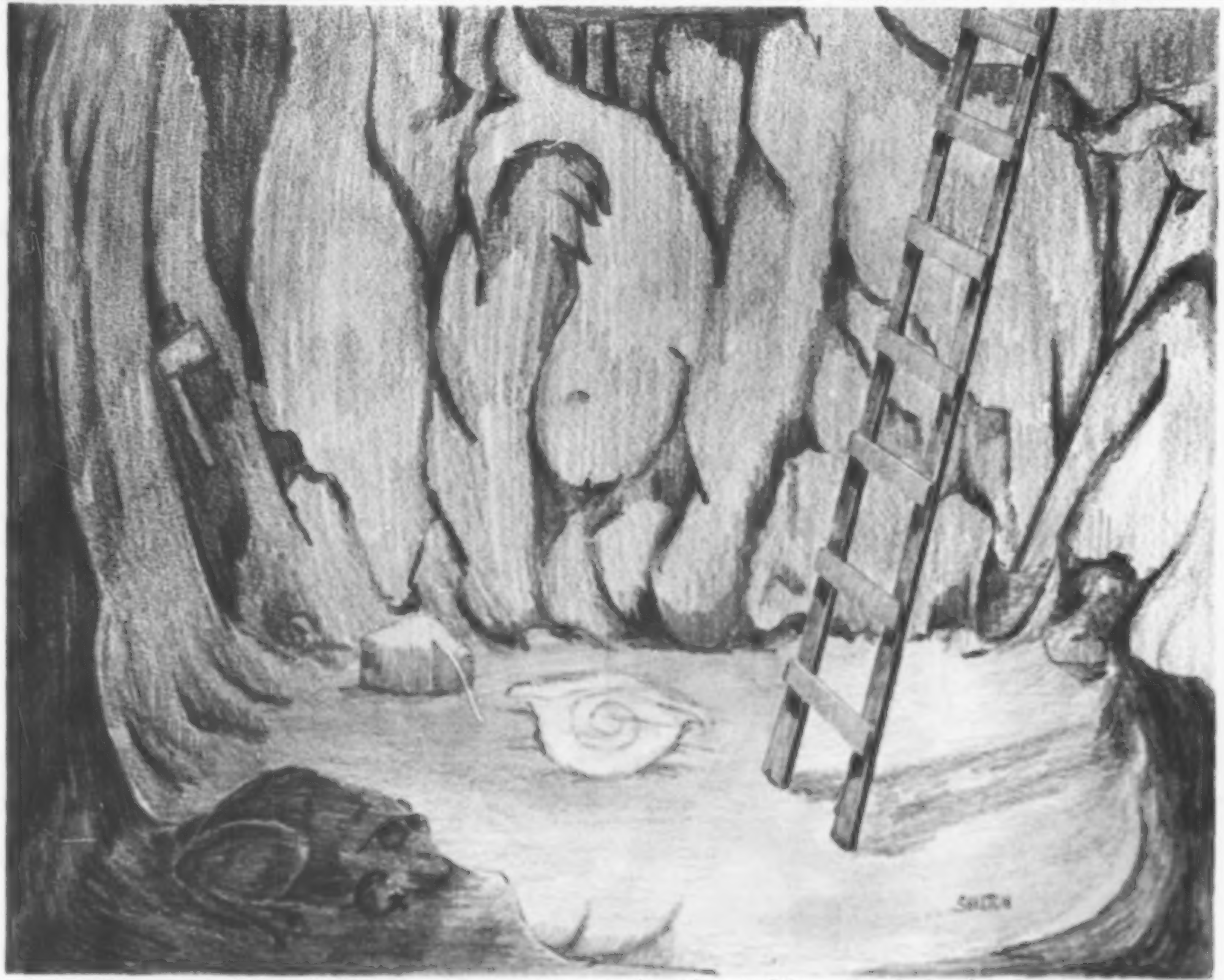
Wilmer lived on a houseboat that float loated in the river. His friend Timothy lived on the shore. One day
Timothy went to visit Wilmer and saw m w many things at Wilmer's home that his family didn't have. What are
they? DRAW A CIRCLE AROUND EACH OBJEC BJECT THAT WILMER HAD AT HIS HOUSE THAT TIMOTHY WOULD NOT HAVE.

Name ______________________ School ______________________ Date ____________ Room ________



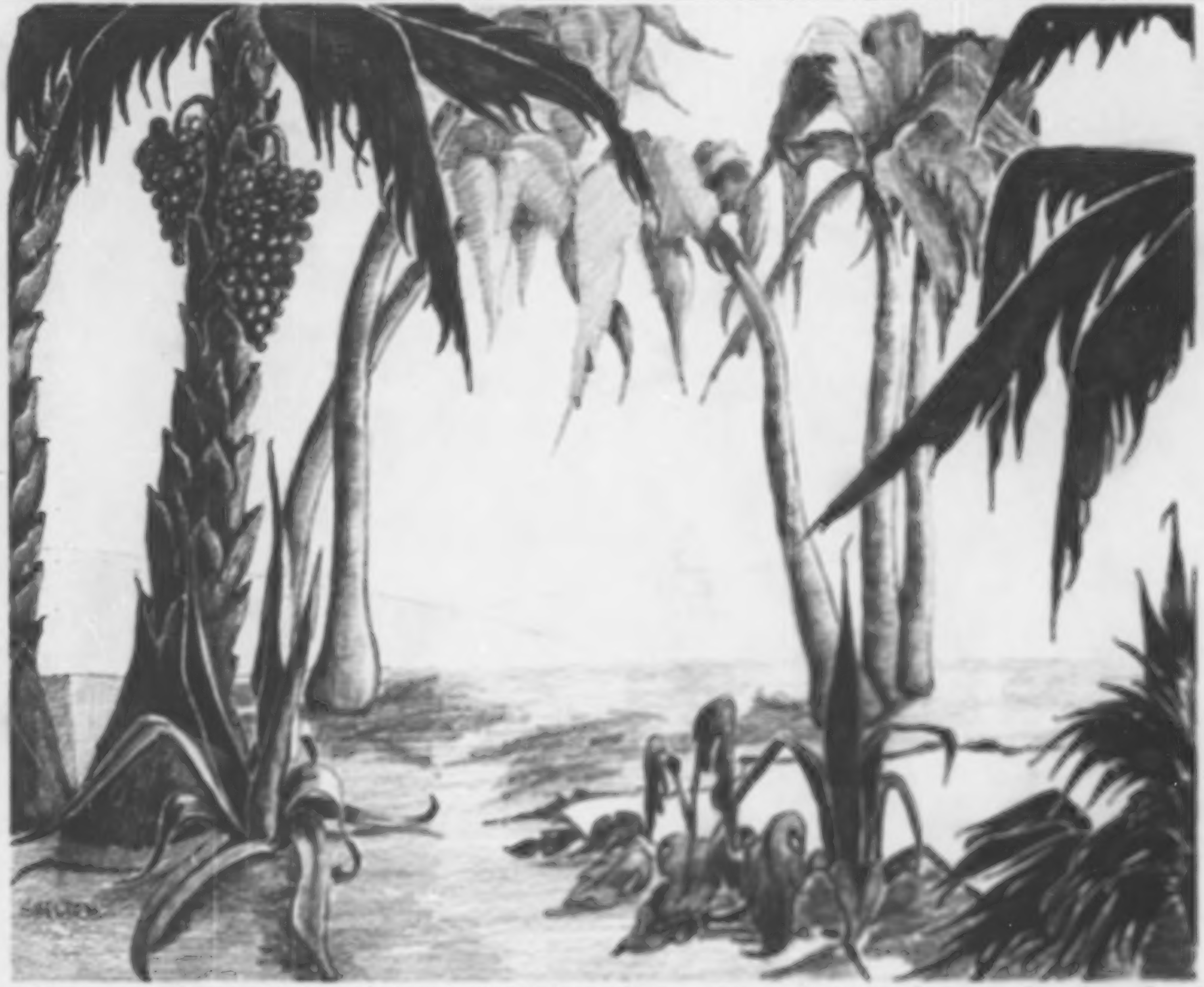
The space men were about to land on the planet Mars. They did not know what was ahead of them. They could see the planet through their telescope as they approached it. Suddenly they saw something moving around on the planet. They were concerned because they knew something was alive on Mars. DRAW A CIRCLE AROUND WHAT THEY SAW.

Name ____________ School ____________ Date ________ Room ________



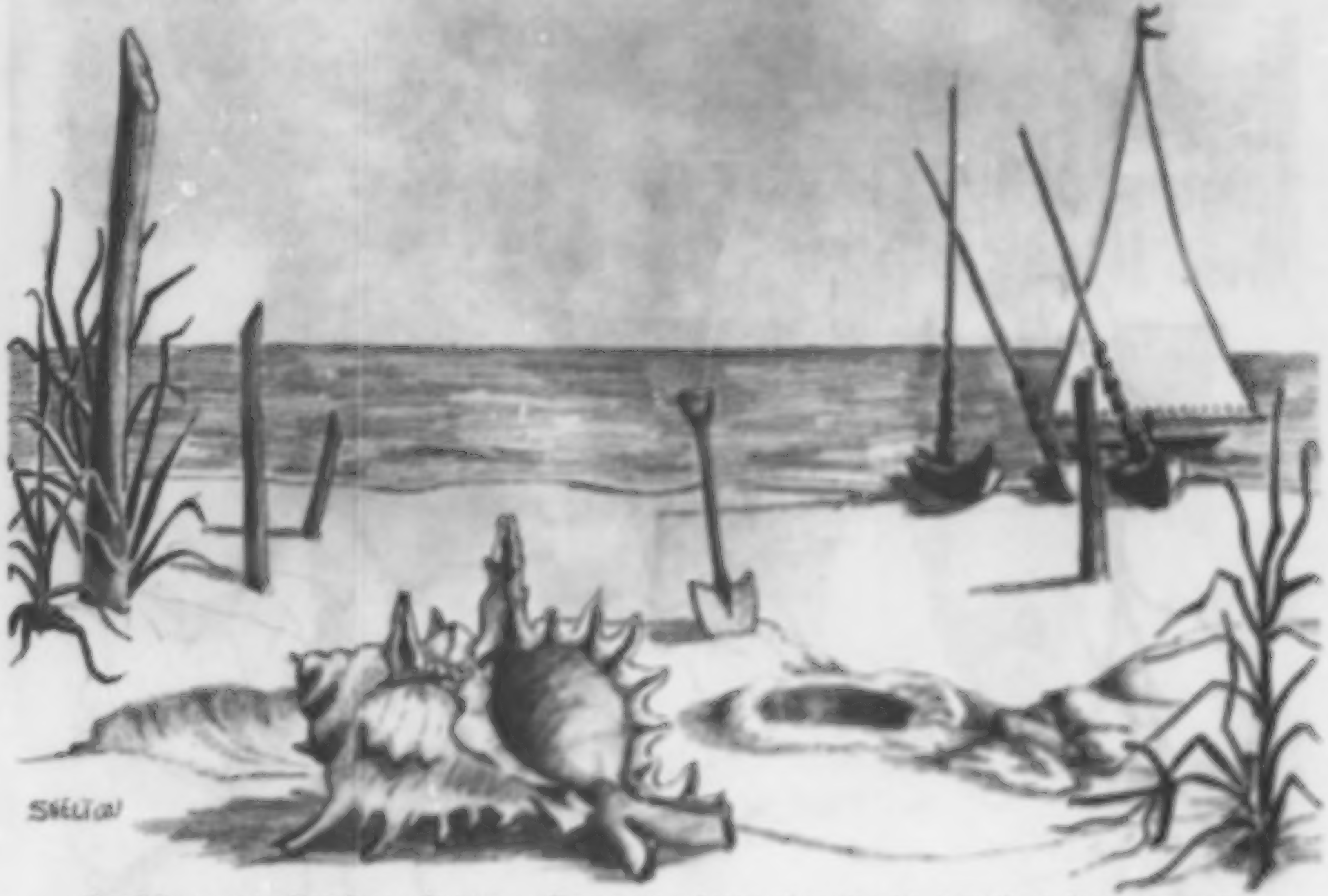
It was the dry season. No water was in the well. Fred decided to put the ladder down and climb into the well. When he reached the bottom he was surprised at what he saw. DRAW A CIRCLE AROUND THE STRANGE THING HE FOUND IN THE BOTTOM OF THE WELL.

Name __________ School __________ Date __________ Room __________



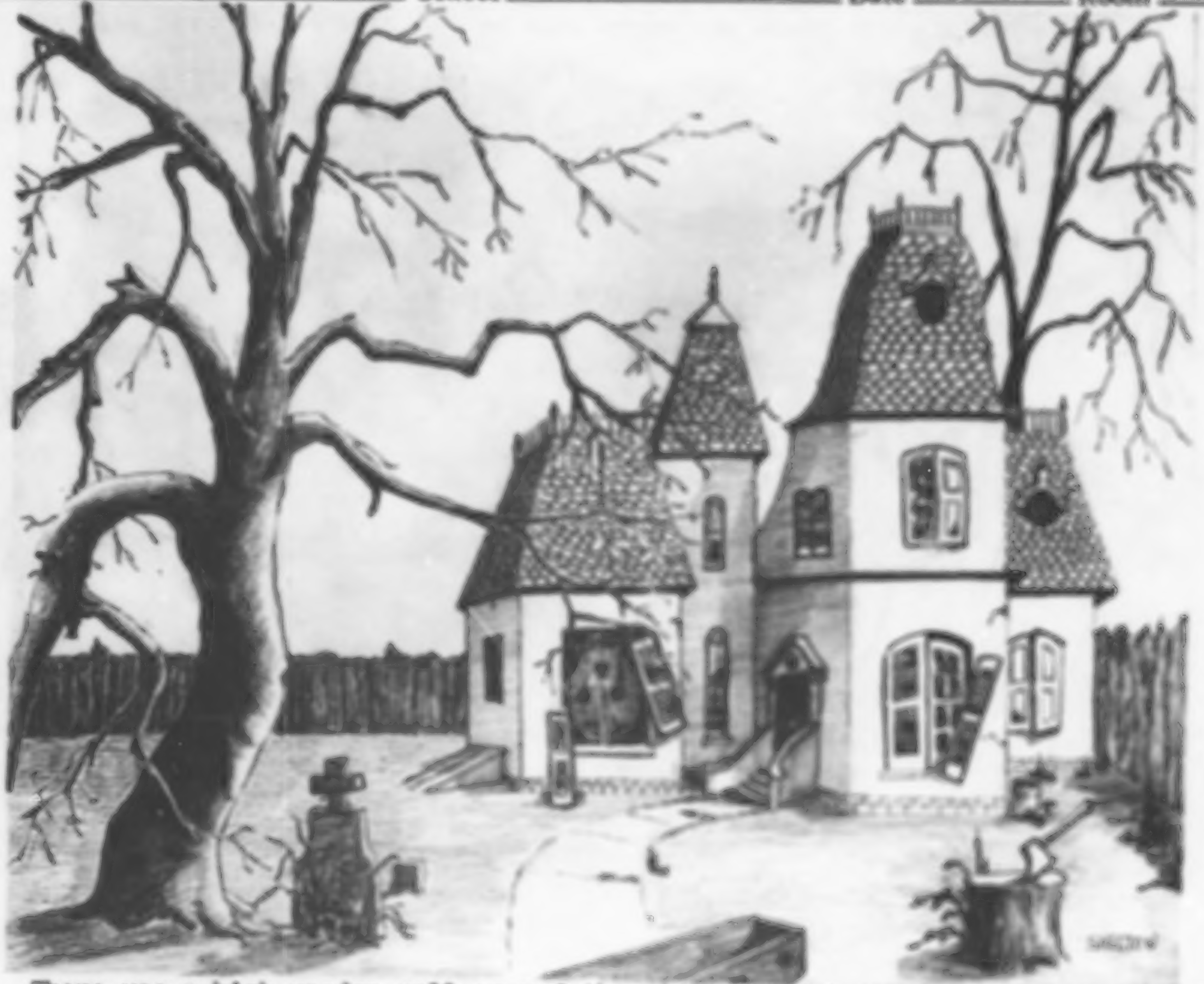
Mary and Tommy had a friend visiting them. He had come from a foreign land. One of their friends asked where he came from. They all laughed and handed him the following picture saying that he could find out if he examined the picture carefully. DRAW A CIRCLE AROUND THE OBJECT THAT TELLS WHERE THE FRIEND CAME FROM. He came from __________.

Name ______________________ School ____________________ Date __________ Room ________



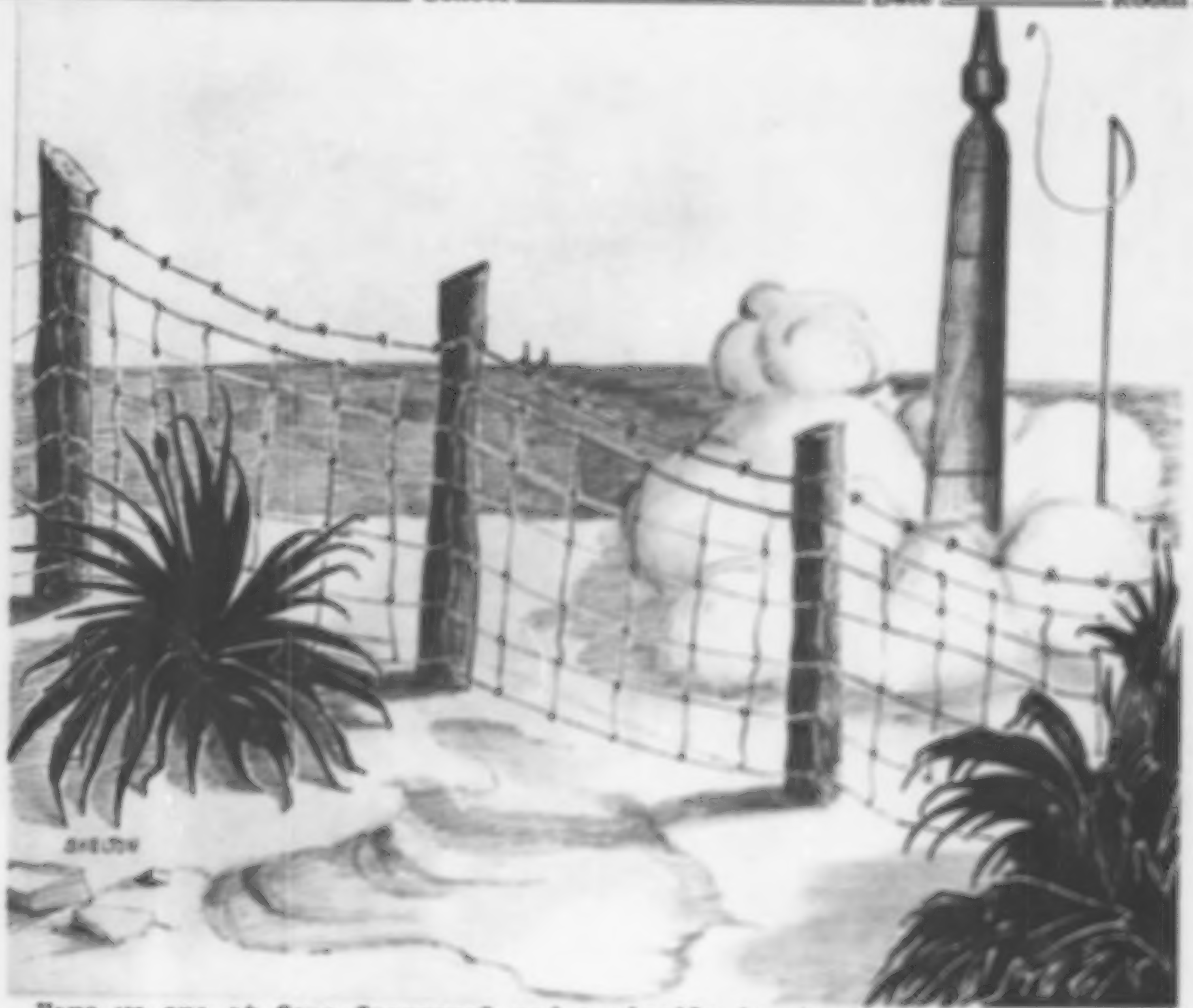
Geoffry was playing pirate. He went along the beach looking for a marker. Then he stepped off ten paces to the north and twenty paces to the west. He began to dig. He never found the pirate's treasure but he did find some things. DRAW A CIRCLE AROUND EACH THING HE DUG UP.

Name ________________ School ________________ Date ________ Room ________



There was a high wooden wall around the old haunted house. Everyone wondered what was behind the wall. Larry built a periscope out of an old mailing tube and two old mirrors. It was long enough for Alice to use to look over the wall. When she did she was frightened. Look in the picture and DRAW A CIRCLE AROUND THE THINGS THAT FRIGHTENED ALICE.

Name ______________________ School ______________________ Date ____________ Room ____________



Here we are at Cape Canaveral and a missile is about to be launched. We talked with one of the men in charge and he told us that this place has a very long history. People were living here long before Columbus discovered America. He told us that if we looked around we could find evidence of these earlier people. We found some things. Can you? DRAW A CIRCLE AROUND EACH OBJECT USED BY THE PEOPLE WHO LIVED HERE BEFORE COLUMBUS.

Name______________________School__________________ Date_________

Room__________

WHAT DO YOU KNOW?

In most schools the pupils can use the encyclopedias. Perhaps you have used the encyclopedias in your school. Encyclopedias contain information about many different subjects. The answers to all of the items below could be found in the encyclopedias if you had time to look them up. We want to know how many you can answer now. Mark an X in front of the correct ending for each item.

1. Whales are large animals. Some of them are more than

_____25 feet long

_____50 feet long

_____75 feet long

_____100 feet long

2. President John Adam's wife used the East Room of the White House as a place to

_____teach her children

_____hold dances

_____serve tea

_____hang the washing.

3. Zanzibar is an island off the coast of

_____Africa

_____Asia

_____South America

_____Europe.

4. Gilbert Stuart was

_____a wicked king of France

_____an admiral in the U. S. Navy

_____an early American portrait painter

_____the discoverer of uranium.

5. Marie Curie was

_____a great scientist

_____a famous actress

_____a singer of folk songs

_____a Red Cross nurse.

6. The biggest bell in the world is

____the Liberty Bell in Philadelphia

____an ancient bronze bell in Japan

____the great bell of Moscow in Russia

____a cast iron bell in China

7. The heart of an adult human being beats at the rate of about

____120 times a minute

____100 times a minute

____90 times a minute

____70 times a minute

8. Johnny Appleseed was a famous

____hill-billy singer

____circus clown

____American pioneer

____English writer.

9. The junco is a

____club used for hunting in Australia

___kind of mouse living in India

____common winter bird in the United States

____group of people who study together.

10. A big old walrus may weigh as much as

_____6000 pounds

_____3000 pounds

_____750 pounds

_____400 pounds

11. Kremlin is

____the fortified part of a Russian city

____the place where the American Congress meets

____a stiff material used to make skirts stand out

____a book of fairy stories.

12. Victoria Falls are located on the

_____Indus River

_____Nile River

_____Rhodesia River

_____Zambesi River

13. The Bessemer furnace is used to

_____refine gold

_____make soap

_____turn iron into steel

_____make lime

14. The humped cattle of India which have been brought into the United States are the

____zebus

____buffaloes

____bisons

____yaks.

15. Delaware is called the First State or the Diamond State; Maine is called the

____ Lighthouse State

____ Lobster State

____ Harbor State

____ Pine Tree State.

16. According to legend, the wooden horse of Troy contained

____ gifts for the goddess Athena

____ Greek soldiers

____ two large sea serpents

____ fire which destroyed the city of Troy.

17. Groundhog is the common name for the

____ woodchuck

____ woodcock

____ the guinea pig

____ the rooting hog of Australia.

18. Venus is a planet that was named for a goddess. Of the planets, it is the

____ closest to the sun

____ farthest from the sun

____ second closest to the sun

____ farthest from the earth

19. The Kookaburra is

____ a small donkey

____ a national park

____ a mountain in eastern New Mexico

____ a bird that lives in Australia.

20. Juliana is

____ the queen of the Netherlands

____ a famous movie star

____ a French actress

____ ambassador to Sweden.

21. In the funnel-shaped cloud of a tornado, the winds may whirl as fast as

____ 50 miles per hour

____ 70 miles per hour

____ 100 miles per hour

____ 300 miles per hour.

22. The Weather Bureau is a part of the

____ Army Signal Corps

____ Commerce Department

____ Department of Interior

____ Department of Agriculture.

23. The United Nations is an organization of nations that works for peace in the world. Its meeting place is

____ Paris, France

____ London, England

____ Washington, D. C.

____ New York City.

24. A boy or girl who can do addition problems quickly might be called a good adder. Adder is also the name of a

____ dog

____ fish

____ snake

____ horse.

25. A Hottentot is

____ an African

____ an Indian

____ a city

____ a cannon.

26. The South Pole was first reached by dogsled. The leader of the expedition was

____ Peary

____ Admundsen

____ Byrd

____ Macmillan

27. Water is made up of

____ hydrogen and oxyden

____ oxygen and carbon dioxide

____ nitrogen and oxygen

____ oxygen and carbon.

28. Alaska was purchased from

____ Canada in 1898

____ Russia after World War I

____ Canada in 1695

____ Russia after the Civil War.

29. The diet of the vampire bat of Central and South America consists of

____ tropical insects

____ the nectar of flowers

____ warm blood

____ tropical fruits

30. Queen Victoria was

____ the queen who helped Columbus

____ one of the great rulers of England

____ the first queen of France

____ the only English queen who did not marry.

31. The wife of John Adams was a person of great ability. Her name was

____ Abigail

____ Audrey

____ Alice

____ Aletha

32. John Bull is a name given to

____ farmers

____ all fat men

____ a famous bull fighter

____ England.

33. Sponges are

____ plants that live in sea water

____ animals that live in sea water

____plants that live in the desert

____animals that live in the desert.

34. Joan of Arc

____ was beheaded by Henry VIII of England

____ was burned at the stake

____ died in battle

____ was accidentally shot by a French soldier.

35. "Stonewall" Jackson

____ was president of the United States

____ was killed by an Indian brave

____ led the American forces at the Battle of Bunker Hill

____ was a Confederate general in the Civil War.

36. Cymbals are brass musical instruments which are struck together to produce sounds. They have been in use since

____centuries before Christ

____the American Revolutionary War

____the American Civil War

____World War II.

37. Copernicus was

____a famous Roman general

____the inventor of the wheel

____the astronomer who declared that the earth revolved around the sun

____the artist who painted the pictures on the walls of the Great Pyramid.

38. Clara Barton

____ made the first American flag

____ discovered the white potato

____ wrote the music for the song "America."

____ founded the American Red Cross.

39. The highest mountain in the world is

____ Mount Everest

____Mount Vernon

____Mount Blanc

____Mount Washington

40. The president of the United States who was once a surveyor was

____ Herbert Hoover

____ Franklin Roosevelt

____ George Washington

____ U. S. Grant

41. A loadstone is

____ an iron ore that is magnetized

____ a rock used to hold down a load going down hill

____ a weight used to measure loads of earth

____ a material that is found in the body and must be removed.

Name ______________________ School ________________________ Date ________

Room _______________

DO YOU WANT TO KNOW MORE?

Directions: Read the following stories and then indicate whether you would like to know more about each story.

1

Mary Ann was ten years old and she knew she should stay off the railroad bridge. But one Wednesday afternoon, she found herself on the 300-foot long bridge with three of her friends - Sally, Josephine and Wilma. They had laughed at her when she had told them that her mother said it was dangerous. They had started without her. Mary Ann did not want to be left out, so she followed along. When they were nearly across the bridge, Sally caught her left foot in a crack. The three friends set to work trying to pull Sally Collins free, but her foot was stuck fast. Sally began to cry. Wilma said, "Don't cry, Sally, we'll run and get your mother. She will know what to do."

Just then they heard a train coming. The three friends started running, but Sally screamed, "Don't leave me! Help me! " All three stopped, but only Mary Ann came back. When the sound of the train whistle was heard, the other children ran on. Mary Ann wanted to run, too.

Would you like to know more about this story? YES NO

2

Nancy and Tod Jackson and their parents decided to go on a fishing trip at the mouth of French River which empties into Georgian Bay. They drove all day through the Canadian country until they reached a lodge about ten miles south of their destination. Since it was still early in the afternoon, Mr. Jackson asked them if they would like to go fishing. They said they would.

Mr. Jackson rented a Peterborough canoe. It was covered with thin wood instead of canvas, plastic, or aluminum as were the other canoes they knew about. It was very light, however.

Mr. Jackson made everybody fasten on a life jacket which he said was filled with a material called kapok. He wanted them to wear the life jackets because they had to shoot two dangerous rapids which almost swamped the canoe. Soon they came to a beautiful lake surrounded by tall pine trees. They started casting.

Nancy yelled, "I have a bite."

Tod cried, " I do, too."

The fish were biting so well that Tod caught five, Nancy caught seven and their father caught four within a few hours. Tod caught one fish that weighed more than six pounds. It was the largest they caught that afternoon.

Would you like to know more about this story? YES NO

3

Mr. Jefferson Jones works for the Foracker Pipe Company. He keeps books for them. Mrs. Pauline Jones owns and runs Betty's Beauty Shop located at Swiss Lane and Maple Avenue in Glenside. Last summer they decided to do something they had dreamed of doing for fifteen years. They took their oldest son, George, and his wife, Sarah, and headed southwest. When they reached Folsom, New Mexico, they went shopping. They bought work clothes, tools, two umbrella tents, food, pots and pans, blankets, and medicines. They also hired four ponies and two pack mules.

Would you like to know more about this story? YES NO

4

Paul and Lawrence decided that they wanted to run away from home. They lived on a farm two miles from town. Their father raised goats and they had to milk 20 goats every morning and every evening.

They climbed into the tree house that they had built in an old oak tree. They tried to figure out where they would go if they left home. Paul wanted to go to New Orleans and try to get a boat to South America. Lawrence said he didn't think they could get a job on a boat because they were only fifteen years old. He thought they could get on a bus and go to Montana. He thought they might find work on a ranch.

Then they both laughed because they saw that if they ran away from work, they would only find more work they would have to do. They decided they had better stay at home.

Would you like to know more about this story? YES NO

5

Last August, when the Smith family was taking a trip in Canada in their new Plymouth, Mrs. Smith read from the travel book that they had received from the American Automobile Club that there was a hill nearby called Magnetic Hill. She read that a car will roll up the hill if it is not in gear and its brakes are not on.

"That is impossible," said Pat, "We studied about gravity in Mrs. Wilson's science class. The force of gravity would keep the car from rolling up the hill."

"Let's drive over and see," said Mr. and Mrs. Smith together.

They drove five miles to the place where the hill was supposed to be. A young man who was a guide stopped them. He told them to drive their car to the bottom of the hill, then to put the car out of gear and release the brake.

Would you like to know more about this story? YES NO

6

Tom was telling Ruth about a game his father used to play. He said it was called peggy. It was played by hitting a short wooden peg with a longer stick. The short peg was about an inch thick and about six inches long. It was sharpened to a point at each end. The longer stick was two feet long. It was the thickness of a broomstick and flattened at one end.

To begin the game it was necessary to pitch the peg from a starting line into a circle which was 20 paces away. The first player to put his peg in the circle could start driving his peg away with the larger stick. This was done by hitting the point of the peg in such a way as to make it hop into the air. When it was in the air the player hit it as hard as he could.

The player who drove his peg the farthest from the circle in three tries won the game. Tom said he played the game with his father and his father hit his peg twice as far as he did.

Would you like to know more about this story? YES NO

7

Frances and Dale lived in the village of Oak Grove which was three miles from a large city. One early evening about six o'clock they were walking toward home. Suddenly they both saw a bright light in the southern sky. It was coming toward the north and seemed to be the size of the full moon. It was moving very fast. As they stood in front of Mr. Ferguson's house and watched, the object seemed to explode because the light became much brighter and flashed out on all sides. Frances and Dale were very frightened and couldn't keep from trembling. They were both thinking, "Will it hit our home?"

Would you like to know more about this story? YES NO

8

Mr. Johnson had been asked by the government to go to Nepal, a little country in the Himalaya mountains. Mr. Johnson was the father of Floyd and Alice. He told them that they could go with him.

He told them that they would live in an old palace in the city of Katmandu where people started the trips to climb the high mountains like Mt. Everest. He said they might meet some mountain people called Sherpas.

Mr. Johnson said that they would have to fly to Katmandu because there were no roads into the country. He assured them that they would have an automobile to ride in when they got there.

Alice asked how this could be. Floyd said "I read all about it in our geography book." They carry the automobiles over the mountains on the backs of men. It takes over 100 men to carry each automobile."

Would you like to know more about this story? YES NO

9

Mr. and Mrs. Karl Swishelm lived in Kansas on a farm. They were the aunt and uncle of Maxine and Jack Clearwater who lived in New York City.

Last May, Maxine and Jack went to visit the Swishelms. They travelled by bus with their mother. On the way they stopped in several cities including St. Louis.

When they got to the farm Mrs. Swishelm showed them a cellar which she said was a cyclone cellar. She said that if they saw a funnel-shaped dark cloud coming in their direction they should run for the shelter.

Early in June, Maxine and Jack were out in the field when they saw such a cloud. They were frightened and ran as fast as they could for the cellar. They were more than eight hundred feet from the cellar and the cloud was moving toward them very fast. They saw their mother and the Swishelms enter the cellar. They ran even faster. They were afraid they wouldn't make it in time, but Mr. Swishelm held the door open and they dashed in just in time.

Would you like to know more about this story? YES NO

10

Walter and his sister, Helen, were in the woods. They found an old grapevine on which they could swing. They could run and grab the grapevine and it would carry them across a small ravine. It was fun sailing through the air.

Helen said, "I'm one of the trapeze performers that you see in the circus."

"I'm not," cried Walter, "I'm Superman."

One time they both swung out together and they said they were in a space ship headed for Mars.

They played for two hours and decided to take one more turn each. Helen travelled way across the ravine. Walter said, "I can beat your record." He ran very fast and grabbed the grapevine. Suddenly, it snapped and just when Walter was at the highest point it broke and he fell to the ground with a thud.

Would you like to know more about this story? YES NO

11

Many years ago the people who lived in small villages used to wait for the Chautauqua shows to come to town. These shows were often paid for by the storekeepers who did business in the village.

The shows included music, speeches and magic tricks. The audience often joined in the singing. Everybody seemed to have a good time.

There were special programs for children and young people. Sometimes contests were run and the competition was strong. One day a safety contest was run. Everyone had to take an hour and find how many dangerous places or things there were in the village. They were to turn in their lists to the man running the contest. Willis Brown won because he found more than eighty such places and things.

One time a man came who could draw pictures with chalk from the letters of any word you gave him. Some one said "Constantinople." He drew a city that looked like something one might expect to see in Turkey.

Would you like to know more about this story? YES NO

12

Ruth and Henry were living in a palace in an ancient country. The palace was the home of one of the richest rulers in the world when he came to the capital to carry out his business. He usually lived in another palace located two thousand miles away.

The palace was made of marble and had an inner court. A tall iron fence surrounded the palace yard and two armed guards with white and red turbans stood at the gate.

The floors were covered with beautiful carpets. These carpets were blue, red, and gold and had many interesting designs woven in them. The man who took care of the palace said they were worth at least a half-million dollars.

He also told them that the ruler had buried a million dollars worth of rubies, diamonds and pearls somewhere around the palace and had forgotten where. Ruth and Henry thought it would be fun to look for them. They started a search and everyday they covered just a little more of the palace and the grounds. It was hard work but also a lot of fun.

Would you like to know more about this story? YES NO

Name ____________________________ School_____ ___________Date________

Room________

WHAT DO YOU REMEMBER?

Directions: The following questions are based on the stories you have just read. This is a way of seeing how much we can remember of stories just after we hear them.

I In the story of the railroad bridge:

A. The name of the girl who got her foot caught was

_______ Mary Ann

_______ Sally

_______ Josephine

_______ Wilma

B. The bridge was

_______ 100 feet long

_______ 200 feet long

_______ 300 feet long

_______ 400 feet long

C. The girls went on their walk on

_______ Sunday afternoon

_______ Saturday morning

_______ Monday evening

_______ Wednesday afternoon.

D. The girl got her foot caught

_______ when they started across the bridge

_______ when they had nearly crossed the bridge

_______ when they were in the middle of the bridge.

II In the story of the fishing trip:

A. They were going to fish in

______The Georgian River

______The French Bay

______The Georgian Bay

______The French River.

B. They stopped at a lodge that was

______10 miles south of their destination

______10 miles north of their destination

______10 miles east of their destination

______10 miles west of their destination.

C. The canoe they rented was covered with

______ aluminum

______ canvas

______ plastic

______ wood

D. Tod caught a fish that weighed more than

______ four pounds

______ five pounds

______ six pounds

______ seven pounds

III In the story of the trip to the southwest:

A. The Jones family had dreamed of taking the trip for

______five years

______ten years

______fifteen years

______twenty years.

B. They did their shopping in

______Austin, Texas

______Houston, Texas

______Sante Fe, New Mexico

______Folsom, New Mexico.

C. They bought two

______umbrella tents

______pup tents

______Baker tents

______lean-to tents

D. Mrs. Pauline Jones owned

______Jefferson's Beauty Shop

______Betty's Beauty Shop

______Pauline's Beauty Shop

______The Glenside Beauty Shop

IV In the story of running away:

A. Paul and Lawrence lived on a farm that was

______2 miles from town

______3 miles from town

______10 miles from town

______20 miles from town

B. They had a tree house built in

______a big maple tree

______an old walnut tree

______a large oak tree

______a spreading chestnut tree.

C. Paul wanted to go to

______Montana

______South America

______work on a ranch

______a goat farm

D. The boys were

______ten years old

______twelve years old

______fifteen years old

______sixteen years old

V. In the story of Magnetic Hill:

A. The Smiths were riding in a

_______Ford car

_______Plymouth car

_______Chevrolet car

_______Rambler car

B. Mrs. Smith read about the hill in

_______a travel book

_______a newspaper

_______a magazine

_______a poster

C. Pat said that gravity

_______would keep the car from rolling up hill

_______would pull the car up hill

_______would stall the car at the bottom of the hill

_______would have nothing to do with the car.

D. The guide told them to drive to the bottom of the hill and

______put the car in gear and put on the brake

______put the car in gear and release the brake

______put the car out of gear and put on the brake

______put the car out of gear and release the brake.

VI In the story about the game :

A. The small peg was

_____ 2 inches long

_____ 6 inches long

_____ 8 inches long

_____ 10 inches long

B. The longer stick was

______a foot long

______2 feet long

______4 feet long

______6 feet long

C. The longer stick was

______sharpened to a point on each end

______sharpened to a point on one end

______flattened on each end

______flattened on one end.

D. Tom and his father played the game and

______Tom's father hit the peg twice as far as Tom did

______Tom hit the peg 20 paces further than his father

______Tom's father could not get his peg in the circle

______Tom could not hit his peg when it was in the air.

VII In the story about the bright light :

A. Frances and Dale saw the light at

____five o'clock

____six o'clock

____seven o'clock

____eight o'clock

B. The light was moving

____very slowly

____up and down

____back and forth

____very fast

C. It seemed to explode as they stood in front of

____Mr. Ferguson's home

____Mr. Frank's home

____Mr. Faldon's home

____Mr. Felbeck's home.

C. Their village was located

____one mile from a city

____three miles from a city

____five miles from a city

____seven miles from a city

VIII In the story about Nepal:

A. Floyd and Alice thought they might meet

____the king of the country

____people who lived in thatched homes

____people called Sherpas

____friends of their father's.

B. They would live in a city called

____Kalamazoo

____Katonah

____Katsuyama

____Katmandu

C. Nepal is located near

____Mt. Washington

____Mt. Everest

____Mt. McKinley

____Mt. Juliana

D. In order to carry the automobiles over the mountain it is necessary to hire

____ 25 men

____ 50 men

____ 100 men

____ 200 men

IX **In the story about the storm cellar :**

A. The Swishelms lived in

___St. Louis

___New York

___Clearwater

___Kansas

B. Maxine and Jack saw the dark cloud when they were

___in the driveway

___a mile from home

___800 feet from the house

___inside an old bus

C. Mrs. Swishelm told Maxine and Jack to run for the cellar if they saw

___a funnel-shaped cloud

___a round dark cloud

___a fast moving cloud

___a dark rain cloud

D. Mrs. Swishelm called the cellar a

___cyclone cellar

___weather cellar

___wind cellar

___tornado cellar

X **In the story about the grapevine:**

A. Helen was Walter's

____neighbor

____friend

____sister

____cousin

B. Walter pretended he was

____Superman

____a big bird

____a trapeze performer

____an explorer.

C. The grapevine broke

____just as they started to play

____after they had played for an hour

____just when their mother called them

____after they had played for two hours.

D. They pretended they were in a space ship headed for

____the moon

____Mars

____Venus

____Jupiter

XI In the story about the show that came to the village:

A. It was paid for by

____those who attended
____the local churches
____the local businessmen
____the school board.

B. One day the show ran

____a music contest
____a swimming contest
____an art contest
____a safety contest.

C. The contest was won by

____Willis Brown
____Walter Black
____William White
____Weldon Gray

D. The artist drew a city using the letters of the city

____Cairo
____Constantinople
____Constableville
____Calcutta

XII In the story about the palace :

A. The guards wore

____black turbans

____black and white turbans

____red and white turbans

____blue turbans

B. The palace was made of

____brick

____granite

____limestone

____marble

C. The carpets were worth

____a thousand dollars

____ten thousand dollars

____one-half million dollars

____a million dollars.

D. Ruth and Henry started to look for

____a secret passage out of the palace

____a buried treasure

____a picture in one of the carpets

____a chest of gold.

Name________________School__________________________Date________

Room________________

WHAT I THINK

Directions: The statements below tell what some person did or what he or she usually does. There is no right or wrong answers. Mark the answer that tells what *you* think of it. The best answer is the one that tells what *you* think.

1. Larry looked inside Betty's new lunch box.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

2. Ellen took the insides out of her new fountain pen.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

3. Mary is always asking questions.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

4. Sue asked why the nurse came and looked at the children's throats.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

5. Bob took the jumping jack apart.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

6. Sam turned all of the knobs on the television set to see what would happen.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

7. Susan stood at the window and watched the new neighbors move into the house next door.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

8. John is always poking around looking for new things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

9. Betsy is always peeking into boxes and old bags.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

10. Joe is inquisitive.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

11. Tony often reads books because he likes their titles.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

12. Beth opened the closet door to see what was inside.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

13. When Molly gets a Christmas gift in the mail, she opens it right away.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

14. Bob believes everything the teacher tells him.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

15. When you have something new, Perry always asks what you paid for it.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

16. Jerry does not ask questions; he waits for people to tell him what they want him to know.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

17. Carl often reads books because he likes the pictures on the covers.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

18. Carolyn makes up her mind quickly on almost everything.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

19. Bobby spies on people.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

20. Wilma is interested in so many things that no one knows what she will be doing next.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

21. Ted is curious about things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

22. Roberta often asks questions about what she reads.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

23. Millie does not ask questions even when she very much wants to know something.

____Very Good ____Good ____Neither Good Nor Bad ____Bad ___Very Bad

24. At Sara's party the children played a game in which they had to go all over the neighborhood looking for things.

____Very Good ____Good ____Neither Good Nor Bad ____Bad ___Very Bad

25. Ned spends a lot of time tinkering with old radios.

____Very Good ____Good ____Neither Good Nor Bad ____Bad ___Very Bad

26. Jane looked all around the room when she went to visit her uncle.

____Very Good ____Good ___Neither Good Nor Bad ____Bad ___Very Bad

27. Linda takes things apart to see how they work.

___Very Good ____Good ___Neither Good Nor Bad ____Bad ____Very Bad

28. Tim often uses the dictionary to look up new words.

___Very Good ____Good ___Neither Good Nor Bad ____Bad ____Very Bad

29. Janice explores vacant buildings.

___Very Good ____Good ____Neither Good Nor Bad ____Bad ____Very Bad

30. Jimmy takes things apart to see how they are made.

___Very Good ____Good ____Neither Good Nor Bad ____Bad ____Very Bad

31. Marjie questions everything that sounds strange to her.

___Very Good ____Good ___Neither Good Nor Bad ___Bad ___Very Bad

32. Steve is often puzzled by things he sees, hears, or reads.

___Very Good ____Good ___Neither Good Nor Bad ___Bad ___Very Bad

33. Helen is a busybody.

___Very Good ____Good ___Neither Good Nor Bad ___Bad ___Very Bad

34. Lois sometimes doubts what other people say.

____Very Good ____Good ___Neither Good Nor Bad ___Bad ___Very Bad

35. William gets big-eyed over new things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

36. Ruth sometimes asks personal questions.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

37. Peter picks up strange things and examines them.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

38. Fred is nosy.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

39. When Tom was trying to find out how the doll's eyes worked, he accidently broke the doll.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

40. After Ted took the toy engine apart, he kept working until he learned to put it together again.

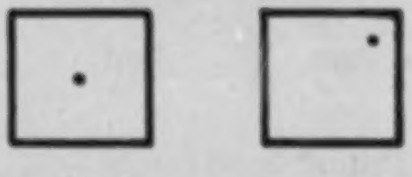
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

Name_________________________ School________________________ Date______________

Room_________________________

WHICH TO DISCUSS?

You are told that there is a story about each figure in the pairs below. If you could hear only one story for each sign, which would you select? Draw a circle around the one in each pair you would want discussed.

1.


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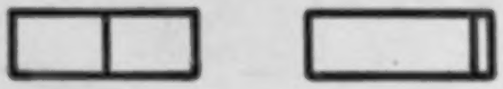

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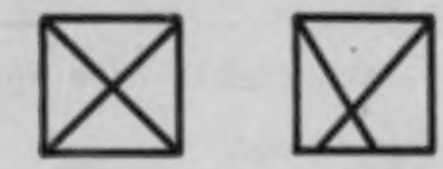

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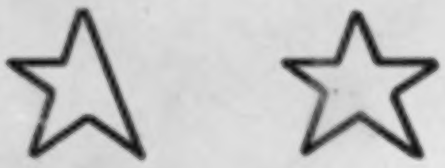
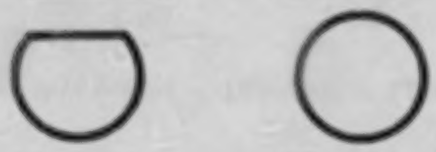


5.


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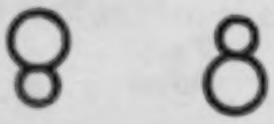

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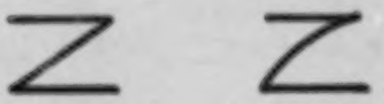

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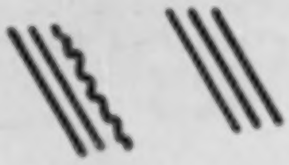

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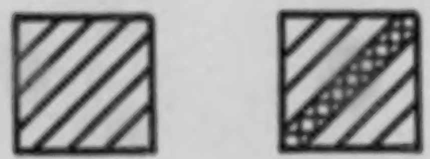

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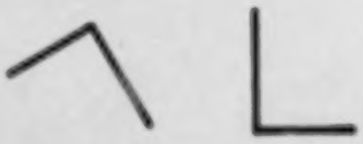

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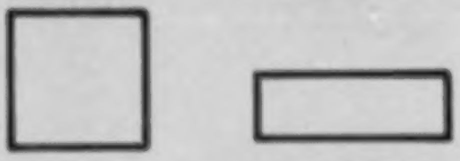

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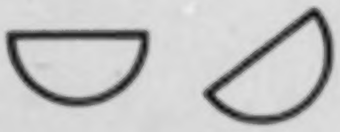

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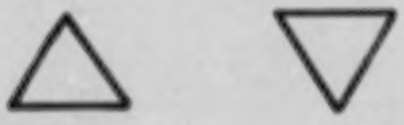

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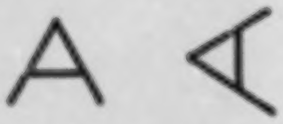

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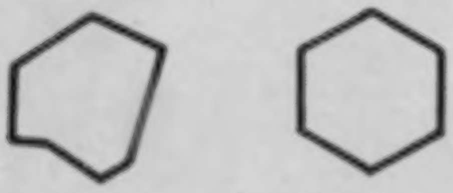

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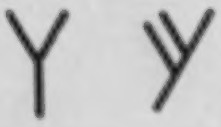

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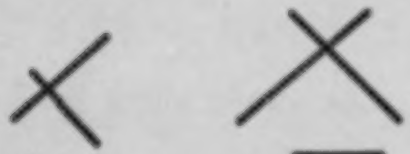

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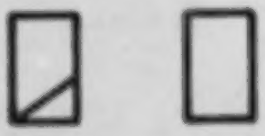

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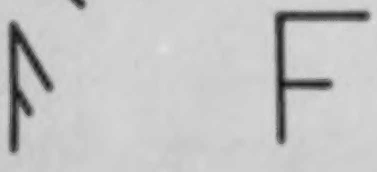

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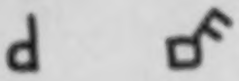

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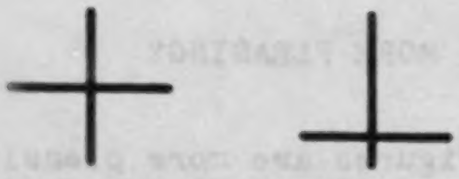

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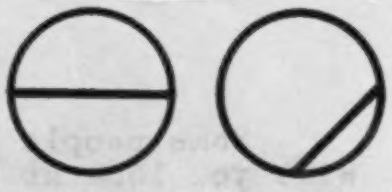

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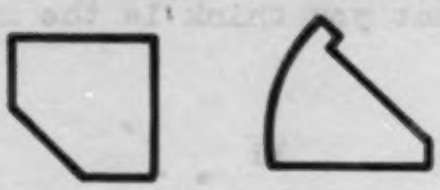

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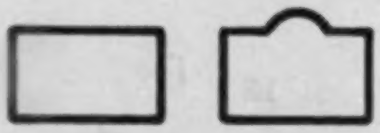

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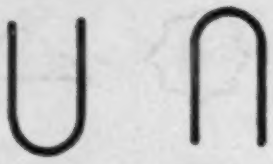

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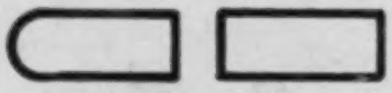

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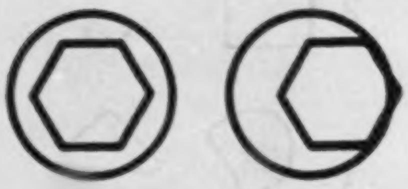

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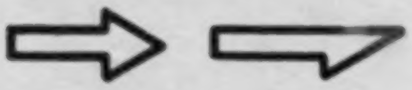

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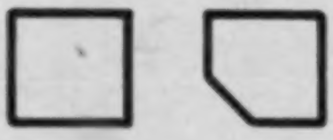

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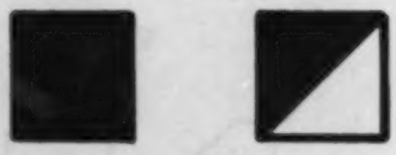

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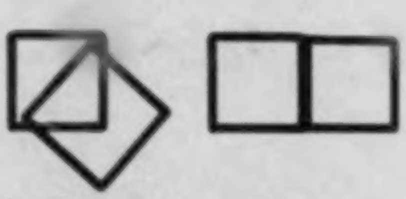

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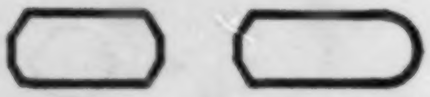

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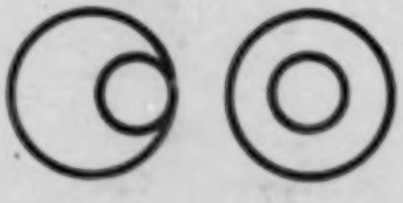

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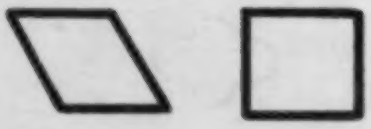

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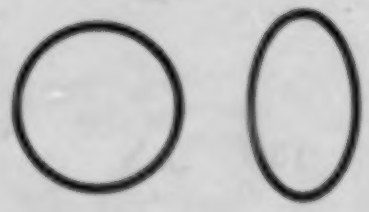

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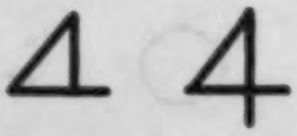

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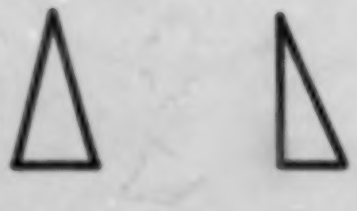

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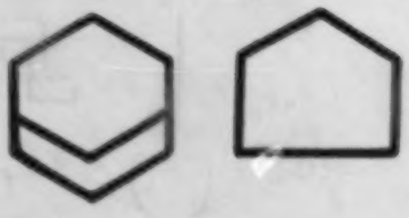

Name ______ ____ ________ School ____________________Date_ __

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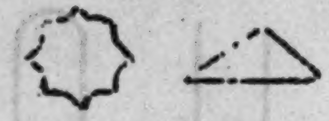
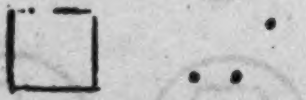
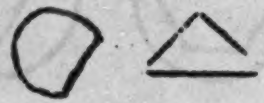
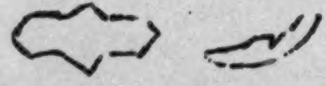
WHICH IS MORE PLEASING?

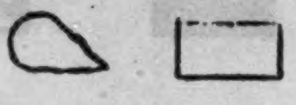
Some people think some figures are more pleasing than others. Will you look at the following pairs of figures and draw a circle around the one of each pair that you think is the more pleasing to look at.

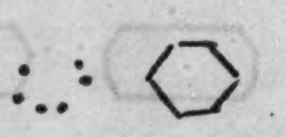
1 

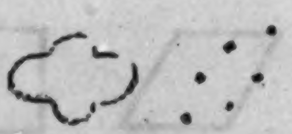
2 

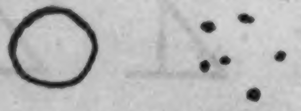
3 

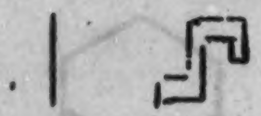
4 

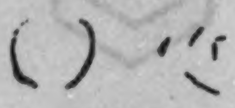
5 

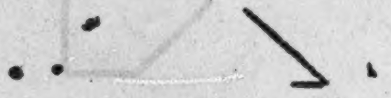
6 

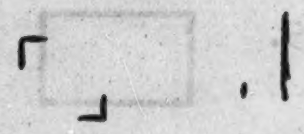
7 

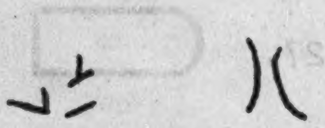
8 

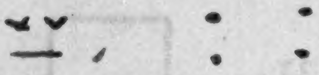


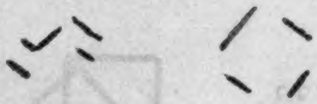
10 

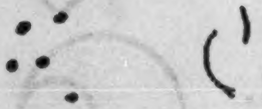
11 

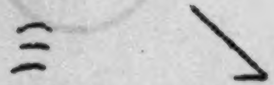
12 

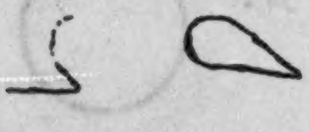
13 

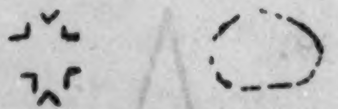
14 

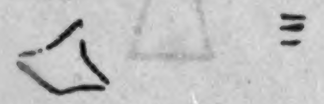
15 

16 

17 

18 

19 

20 

Name ____________________ School ____________________ Date ________

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WHICH SAYING DO YOU BELIEVE?

All of you know what proverbs are. Many people have used them. Benjamin Franklin wrote some in "Poor Richard's Almanac." If you read proverbs, however, you find some that say things that are opposite to what others say. Below are listed pairs of proverbs. Please mark the one of each pair which you believe is most nearly true most of the time.

1 ______ Look before you leap.

______ Who stands still in the mud sticks in it.

2 ______ It is better to be safe than sorry.

______ Nothing venture, nothing have.

3 ______ Where there's a will there's a way.

______ What can't be cured must be endured.

4 ______ The grass is always greener on the other side of the fence.

______ Every bird likes its own nest best.

5 ______ He who hesitates is lost.

______ All in good time.

6 ______ Never start a thing you can't finish.

______ Nothing like trying.

7 ______ Let sleeping dogs lie.

______ If at first you don't succeed, try, try again.

8 ______ It's hard to teach an old dog new tricks.

______ Never too old to learn.

9 ______ Don't bite off more than you can chew.

______ Anything is possible.

10 ______ A new broom sweeps clean.

______ An old broom is better than a new.

11 ______ By hook and by crook he will win.

______ Let well enough alone.

12 ______ It is never too late to change.

______ Keep your nose to the grindstone.

13 ______ Never put off till tomorrow, what may be done today.

______ Time cures all things.

14 ______ A bird in the hand is worth two in the bush.

______ Never do things by halves.

15 ______ Better late than never.

______ Time and tide wait for no man.

16 ______ Big noses get into big trouble.

______ Nothing venture, nothing have.

17 _____Practice makes perfect.

_____Take the line of least resistance.

18 _____Never say die.

_____Better go back than lose yourself.

19 _____If you want a thing done well, do it yourself.

_____The Jack-of-all-trades is the master of none.

20 _____The best view is from the mountain top.

_____Keep the common road and be safe.

21 _____It will all come right in time.

_____Have you something to do tomorrow, do it today.

22 _____It is better to be safe than sorry.

_____He does most who dares to do something.

23 _____Curiosity killed the cat.

_____Seek knowledge so you may act wisely.

24 _____Fortune favors the brave.

_____Stay on the safe side of the boat.

25 _____Dare to follow the truth.

_____Don't rock the boat.

Name______________________School____________________Date____ ___

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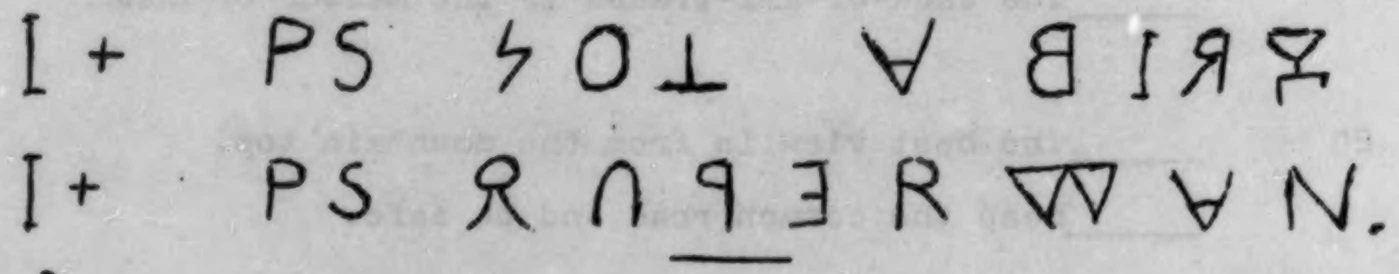
WHICH TO SOLVE?

Let us pretend that you found the following secret messages. You will have to solve each message separately. It is probably better to work on one sign at a time. As you look at each code you will see signs that interest you more than others. Will you draw a circle around five signs in each message which interest you more than others.

1



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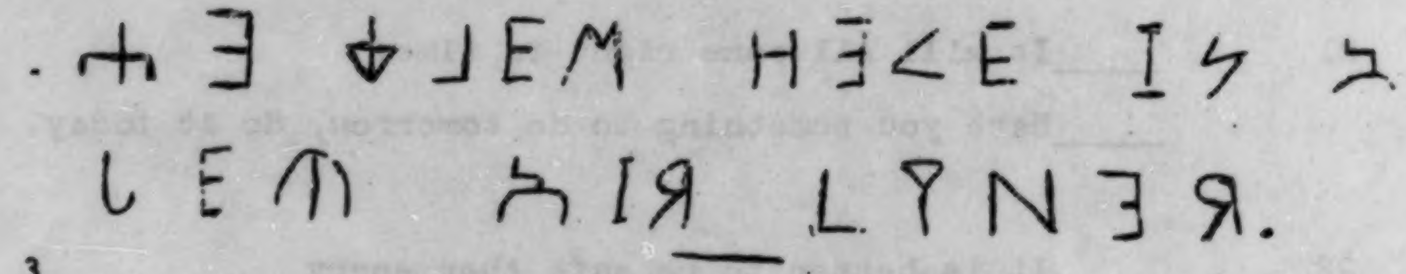

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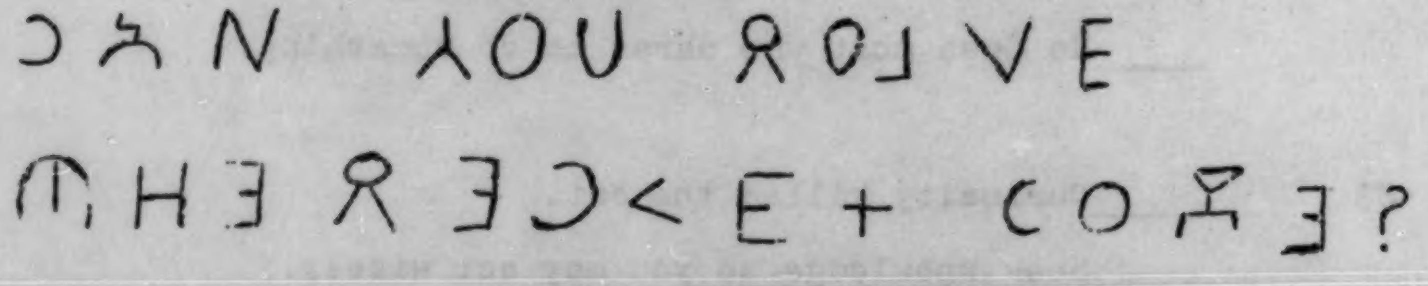

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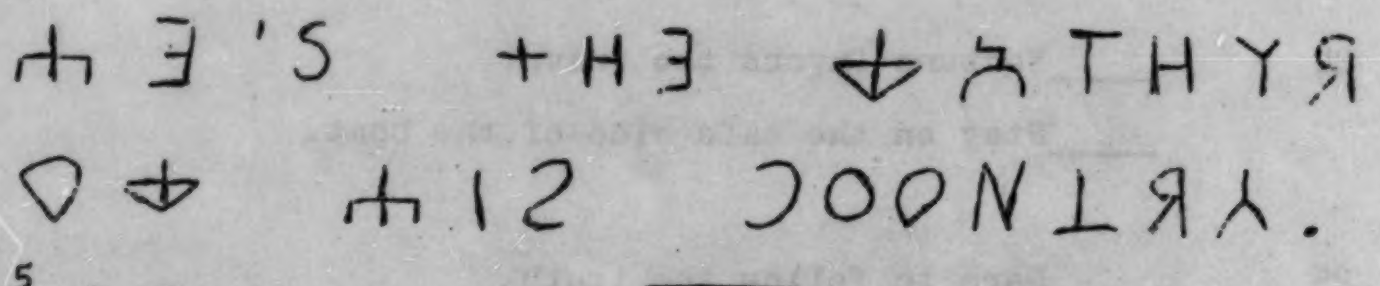

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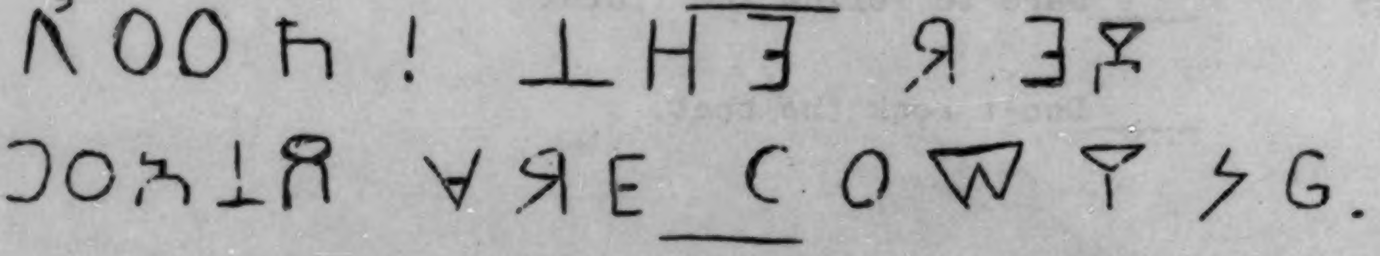
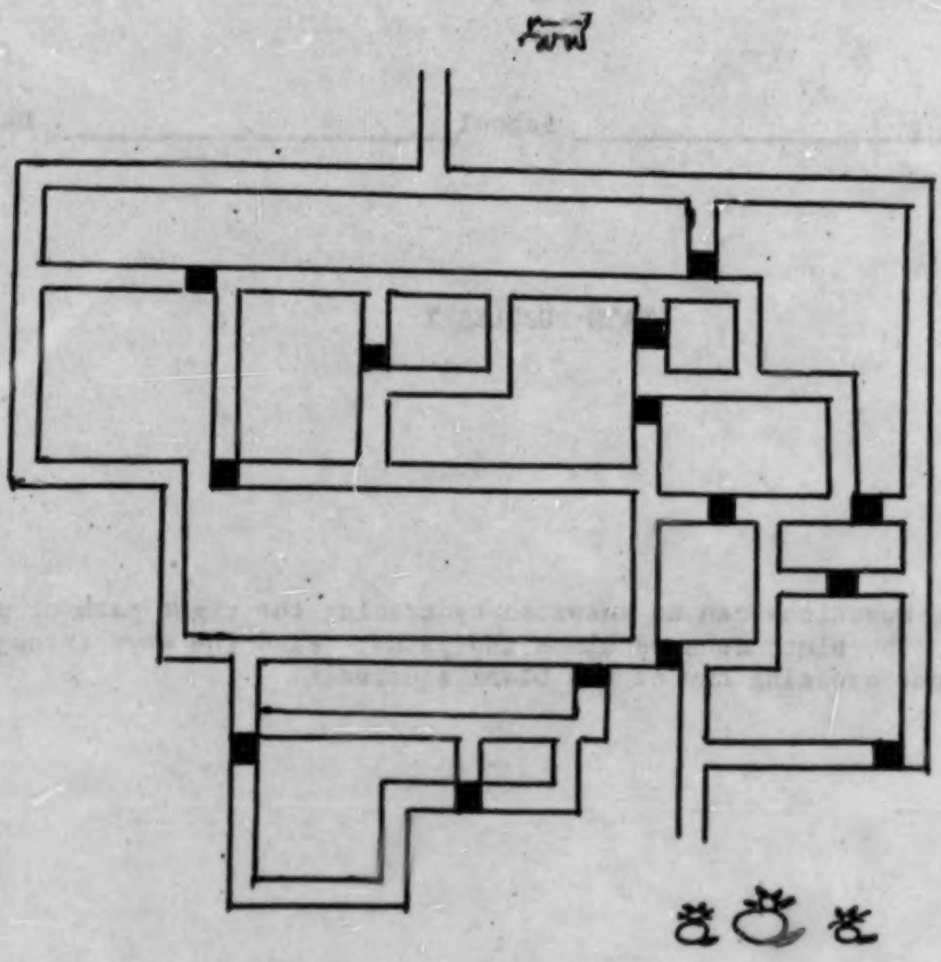


Name________________________________ **School**______________________ **Date**________

Room__________

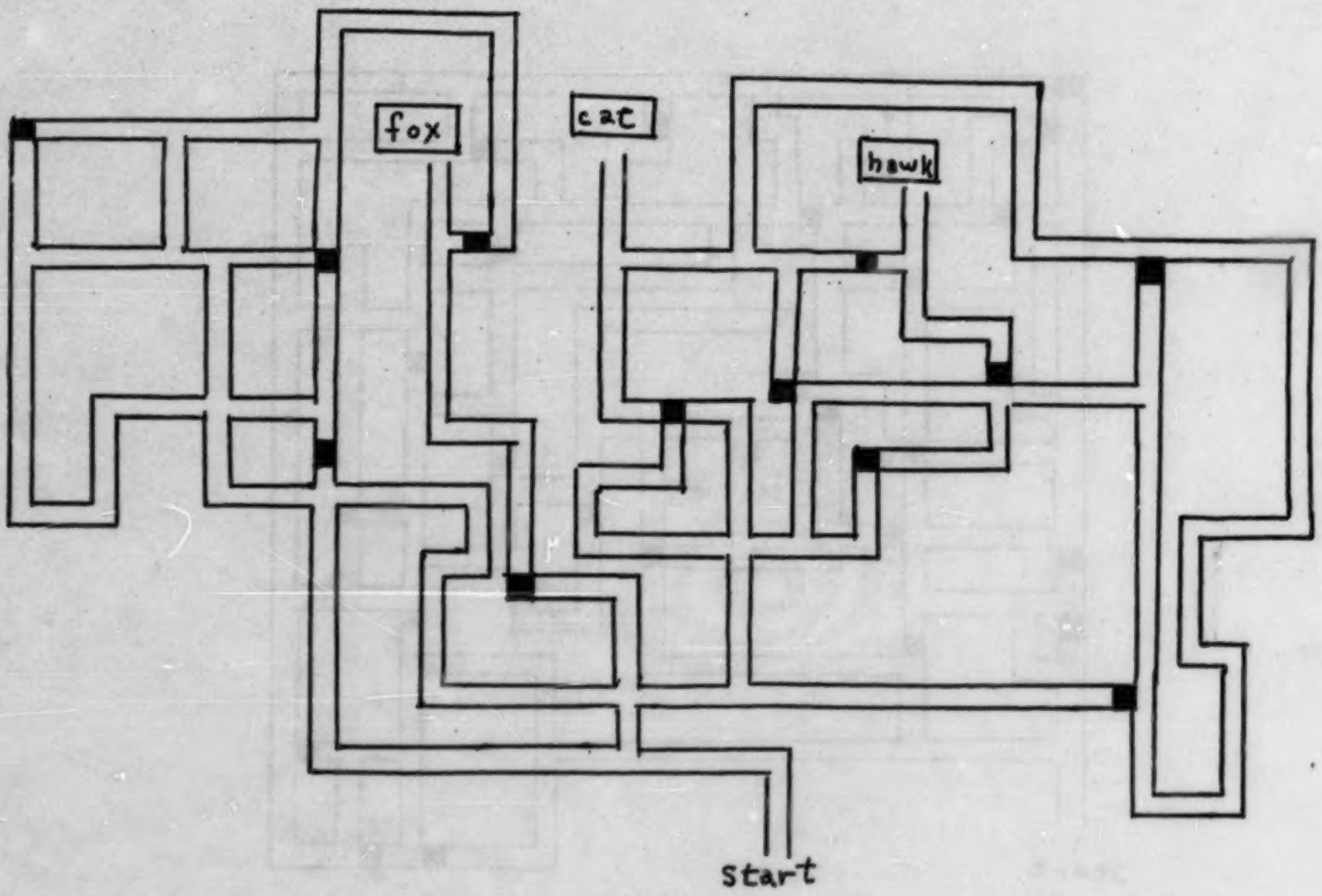
PATH PUZZLES I

The following questions can be answered by tracing the right path or paths in each puzzle. The black squares block the paths. Find the ways through the puzzles without crossing any of the black squares.



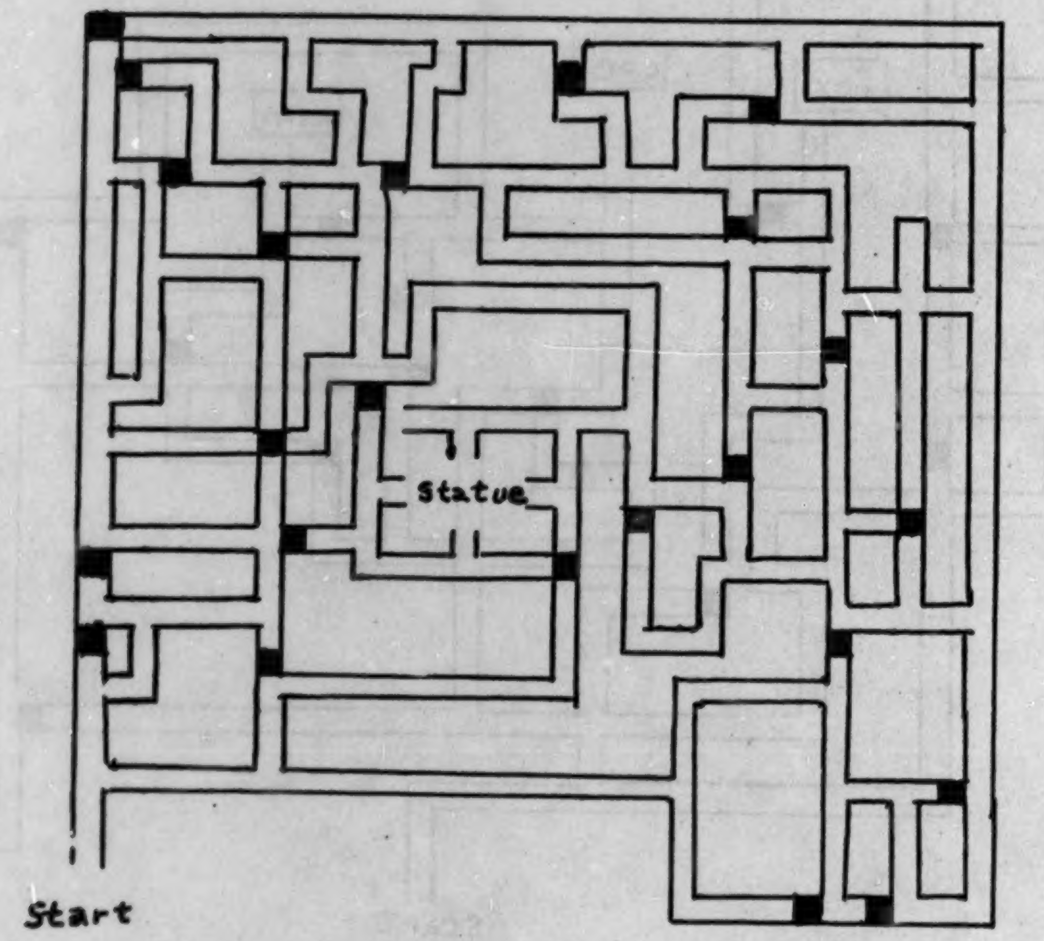
THE LOST KITTEN

The kitten at the top of the page wandered away from the mother cat and went through the maze. The only way to get to the mother cat and the other kittens is through the maze. Mark the path the kitten will have to take through the maze.



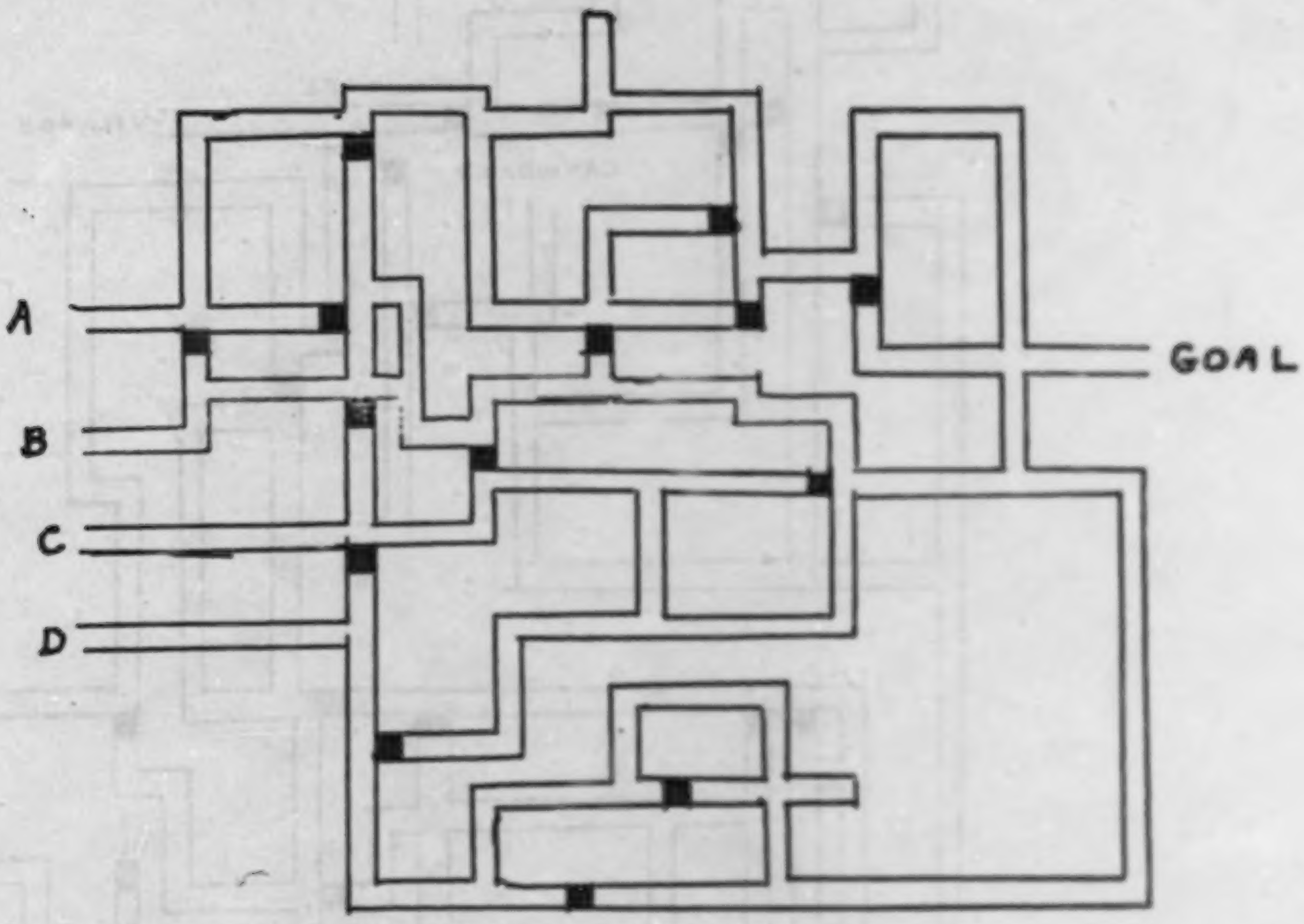
WHO KILLED COCK ROBIN?

A detective is trying to find the one who killed cock robin. He knows it was either the fox, the cat, or the hawk. An open path through the maze leads to the guilty one. Mark the path and find the one who killed cock robin.



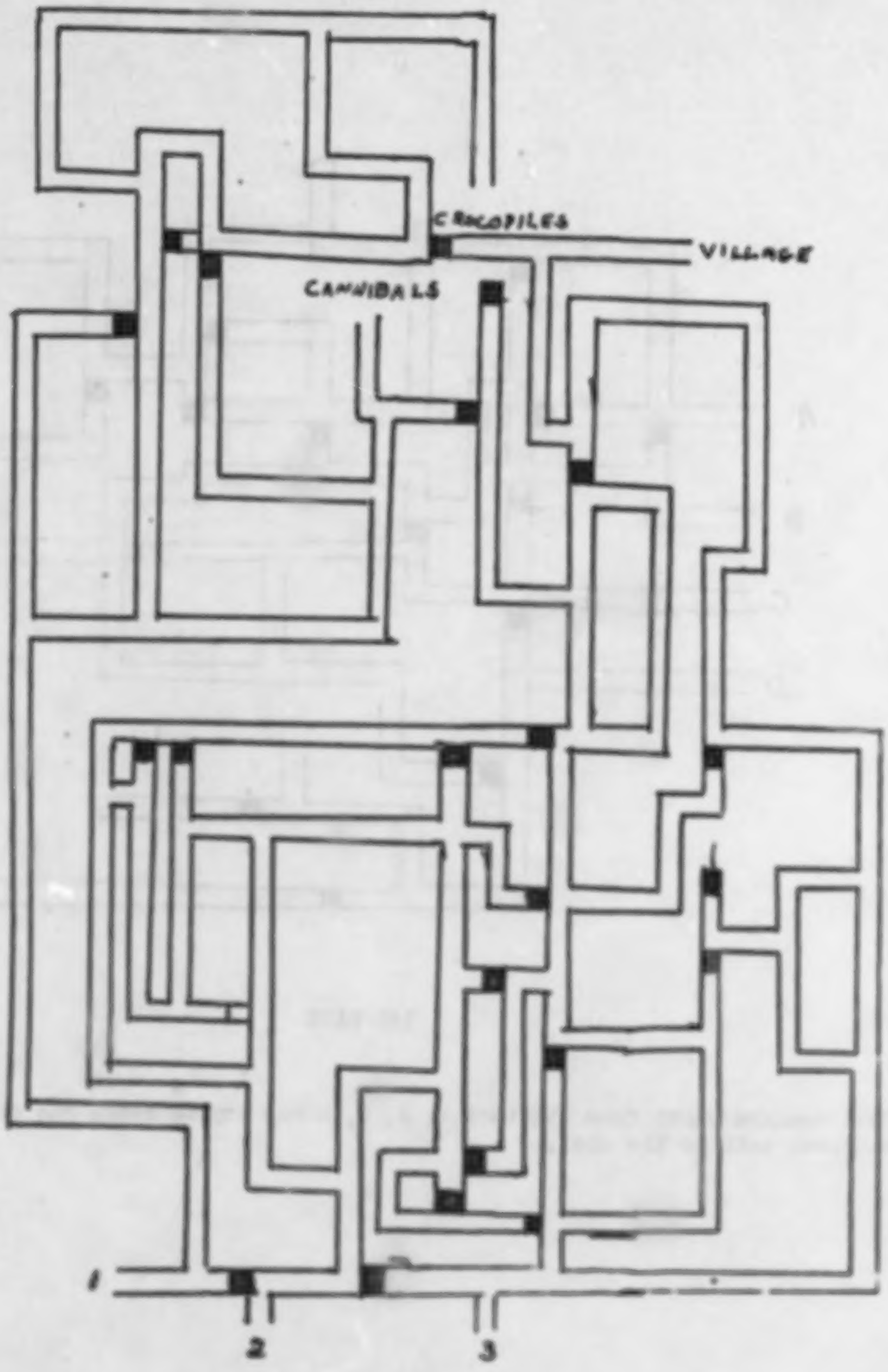
THE LOST TREASURE

Some scientists discovered an ancient building shaped like a maze in the ruins of a long-lost city. After much searching they found their way to the central room where there was a statue encrusted with precious stones. Mark the path the scientists had to take in order to reach the statue.



THE RACE

Four runners start from stations A, B, C, D and try to reach the goal. Mark the shortest path to the goal.



FIND THE FRIENDLY VILLAGE

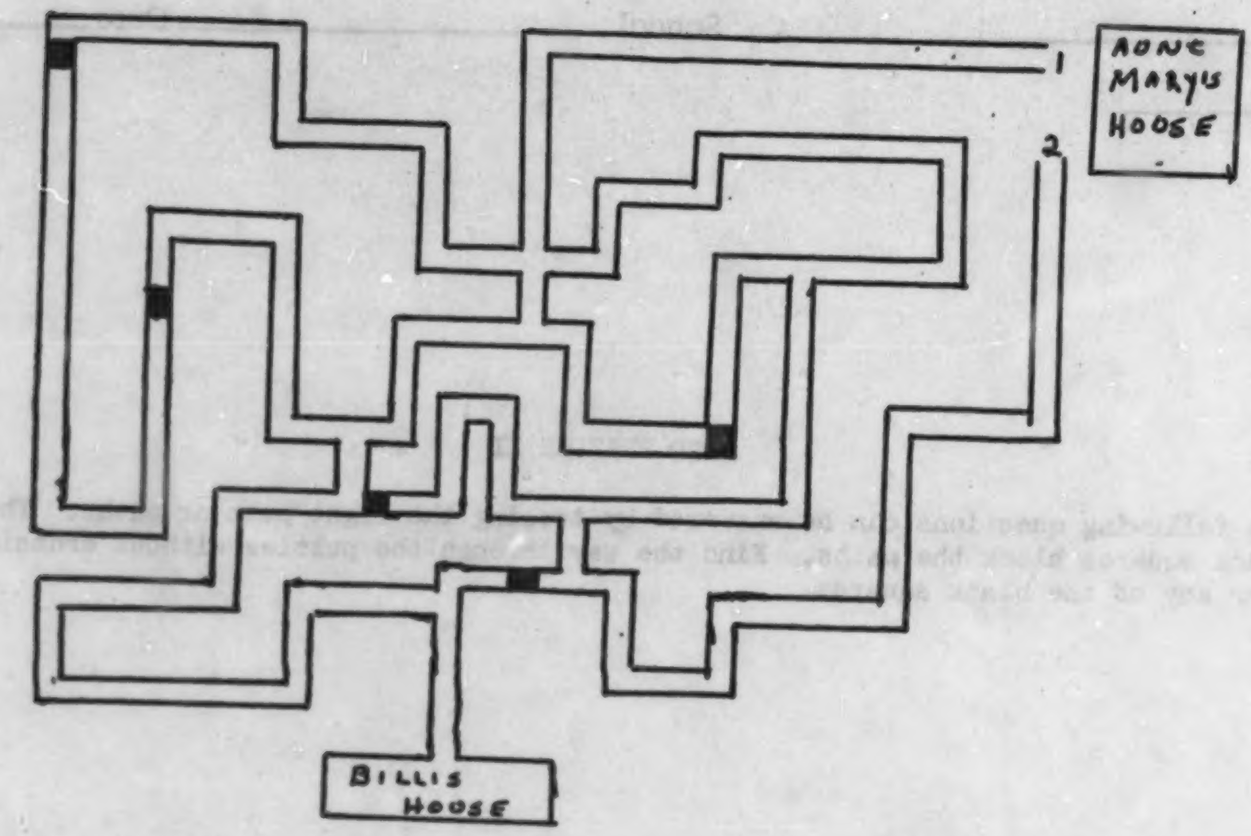
Three people were forced to parachute from their burning plane into the jungle. One followed a path that led him to a band of cannibals who boiled him in a large pot. Another followed a path to a swamp where a crocodile caught and ate him. The other took a path that led to the village of a fiendly people who treated him like an honored guest. Is it path 1, 2, or 3 that leads to the friendly village? Mark the path to the friendly village.

Name ______________________ School ____________________ Date __________

Room ________

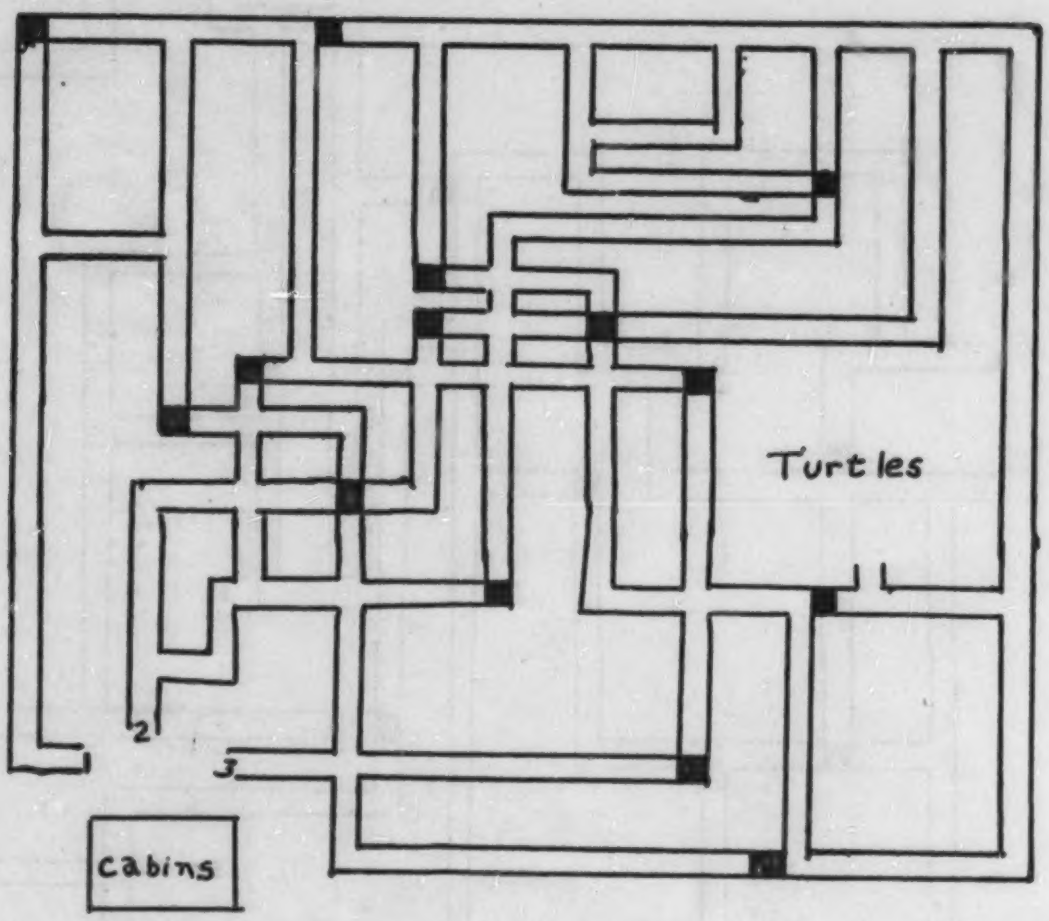
PATH PUZZLES II

The following questions can be answered by tracing the right path or paths. The black squares block the paths. Find the way through the puzzles without crossing over any of the black squares.


1
2
AUNT
MARY'S
HOUSE
BILL'S
HOUSE

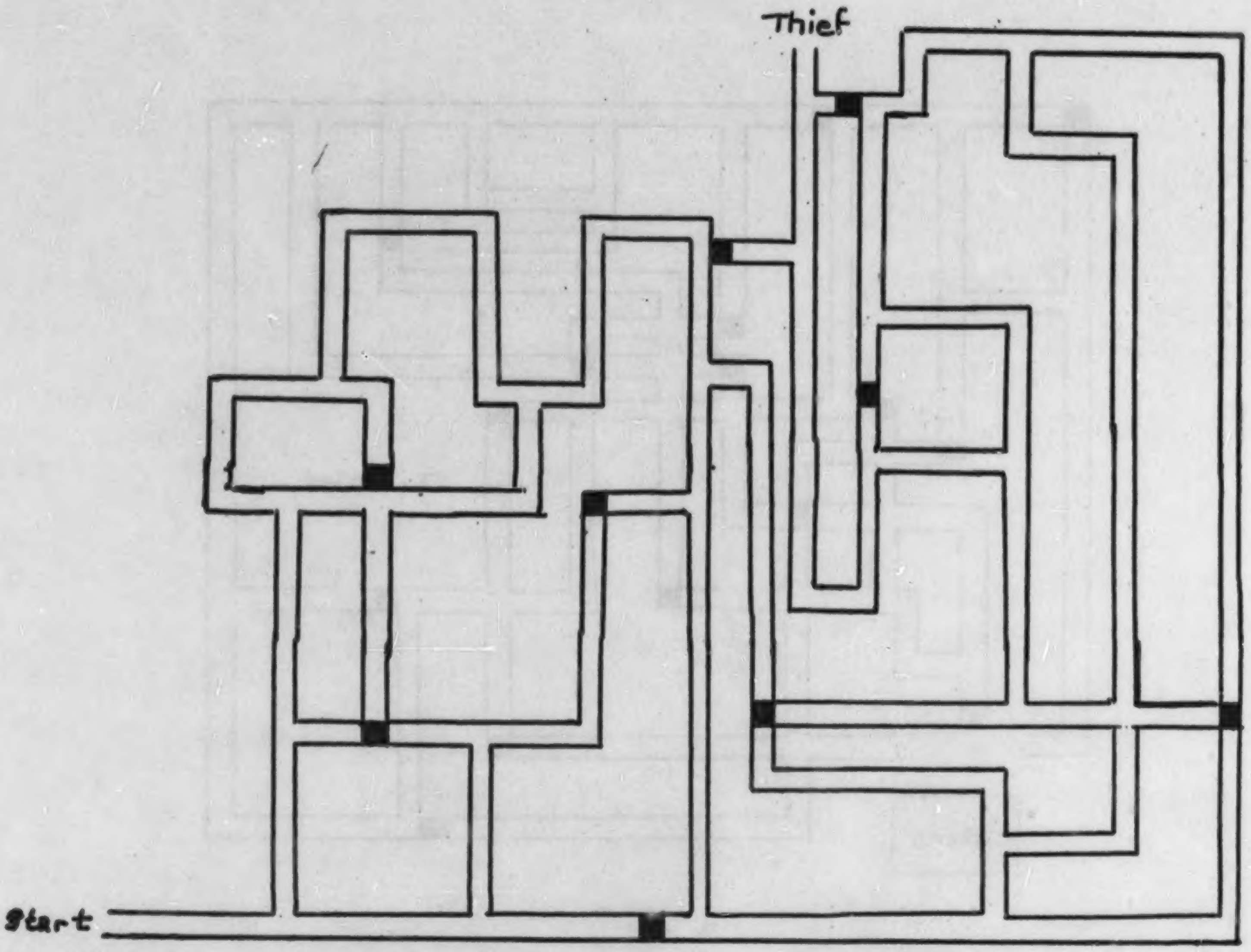
THE SHORTER ROAD

Sam was visiting his Aunt Mary. She told him that both roads one and two lead to Bill's house. Sam wanted to know which was shorter, so she showed him this map. Which road should he take? Mark the shorter road to Bill's house.



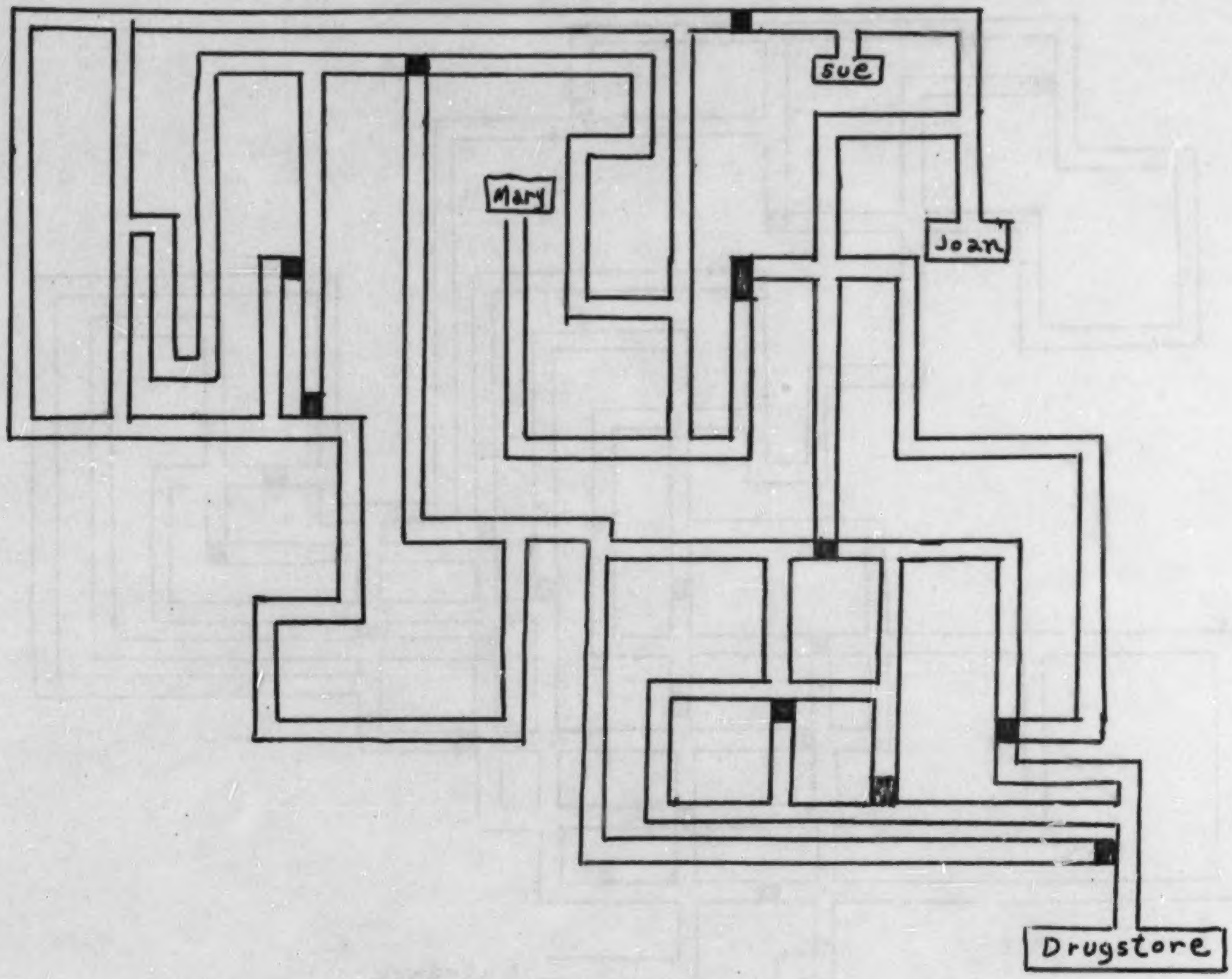
FIND THE TURTLES

Jonathan and his family stayed in a cabin in the woods for two weeks last summer. Jonathan wanted to catch a turtle to take home. The guide told him to follow one of the paths in front of the cabin to a place where he would find turtles. Only one of the paths leads to the turtles. Which one is it? Mark the path that Jonathan took to get a turtle.



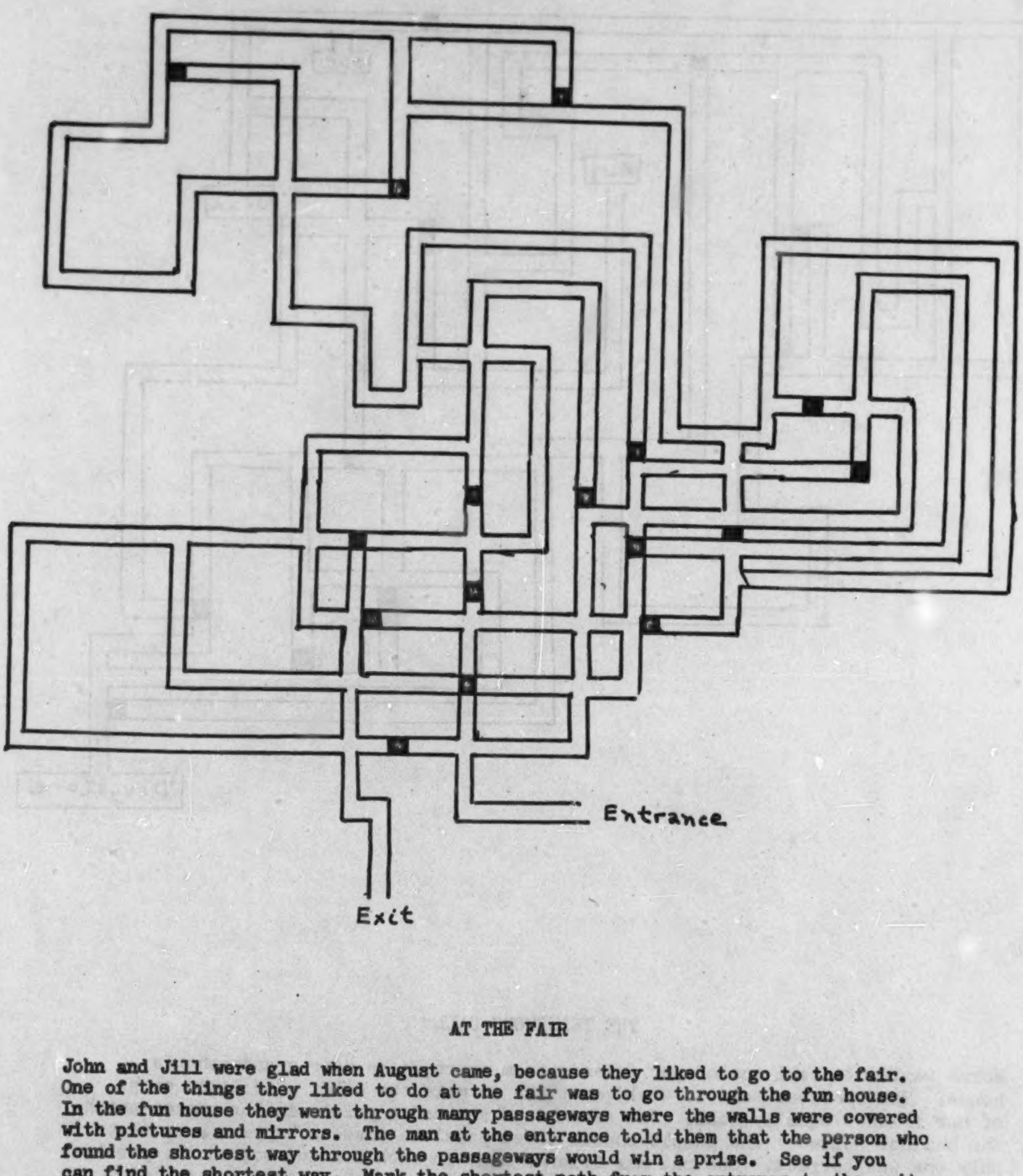
CATCH THE THIEF

A thief robbed the grain store and fled into the mountains. The sheriff had taken his bloodhounds to a neighboring town to look for escaped prisoners, and the people did not know how to track the thief. Fred Jones said, "My dog, Keen, is as good an any bloodhound. He can lead us to the thief." Keen did find the trail that led to the thiefs'hideout without crossing any barriers and with very little backtracking. Mark the trail to the thief.



THE TELEPHONE CALL

Norma wanted to call one of her friends from a drugstore near grandmother's house. The operator said it would cost 25¢ to make the call. She liked each of her friends equally well. She remembered she had a puzzle in her pocket which she had not solved. The puzzle showed three possible answers but she knew that only one was correct. She put her friends name in each box and solved the problem. Whom did she call? Mark the path from the drugstore to the friend she called.



AT THE FAIR

John and Jill were glad when August came, because they liked to go to the fair. One of the things they liked to do at the fair was to go through the fun house. In the fun house they went through many passageways where the walls were covered with pictures and mirrors. The man at the entrance told them that the person who found the shortest way through the passageways would win a prize. See if you can find the shortest way. Mark the shortest path from the entrance to the exit.

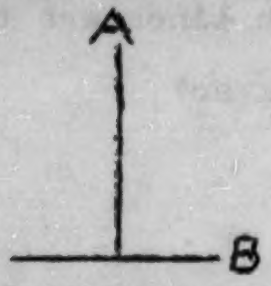
Name________________School________________Date__________

Room__________

WHICH ONE?

For each of the following, mark the answer which tells what you think. Then tell why you think as you do.

1.



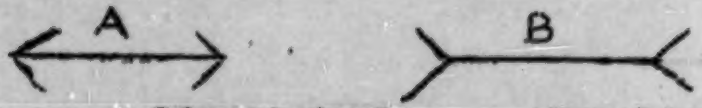
_____Line A is longer than line B.

_____Line B is longer than line A.

_____Both lines are the same.

Why do you think so?

2



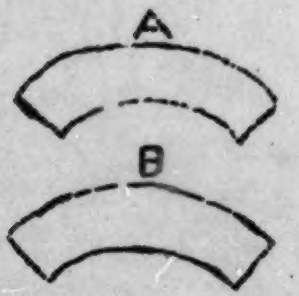
_______Line A is longer than line B.

_______Line B is longer than line A

_______Both lines are the same.

Why do you think so?

3.



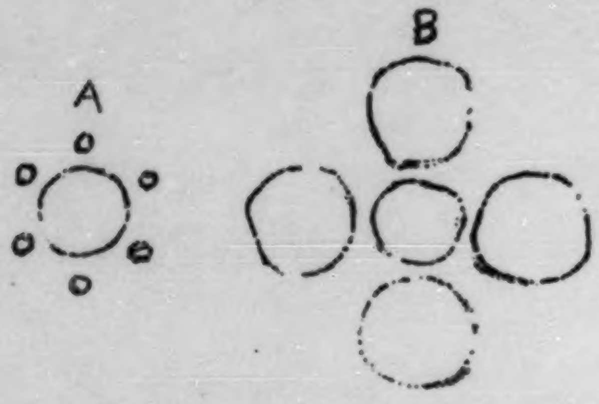
_______A is larger than B.

_______B is larger than A.

_______Both are the same size.

Why do you think so?

4.



______The middle circle in A is larger than the middle circle in B.

______The middle circle in B is larger than the middle circle in A.

______Both circles are the same size

Why do you think so?

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APPENDIX C

Measuring Instruments Developed for the Second Preliminary Study

Page

1. Picture-Satisfaction Test
   (See 1-B, 1-D, and 2-B of Appendix B)

2. Story-Satisfaction Test
   (See 3-C, 4-A, and 4-B of Appendix B)

3. What-Would-You-Do Test (Revised) 236

4. What-Do-You-Know Test (Revised) 248

5. The-Trip-To-The-Zoo Test 258

6. Questions About The Trip to the Zoo 261

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8. Which-To-Discuss Test
   (See 11 of Appendix B. Page 2 was added for second preliminary study.)

9. Which-Saying-Do-You-Believe Test (Revised) 267

10. Riddle-Path-Puzzles Test I 271
    A. The Kitten 272
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    C. The Rainbow 274
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Name______ ____________ School____________________ Date__________

Boy_______ Girl_______ Room________ _________ ____

WHAT WOULD YOU DO?

Directions: In each of the questions below, mark the thing you think you would do or would prefer to do if you had to do one of the four. There is no wrong answer. You may prefer to do one thing and someone else may prefer to do something different.

1. If you were a Boy Scout or a Girl Scout, would you prefer to work on:

_____ a stamp collecting merit badge

_____ a first aid merit badge

_____ a pathfinding merit badge

_____ a safety merit badge?

2. If you were walking across an open field and you found an old golf ball that had been knocked out of shape, would you:

_____ give it a kick

_____ throw it away

_____ cut it up to see how it was made

_____ play golf with it?

3. If you could play anything you wanted to play, would you pretend you were:

_____ a general

_____ an Indian Chief

_____ an explorer

_____ a river pilot?

4. If you could have any of the following for your birthday, would you select:

_____ a phonograph

_____ a badminton set

_____ a checker game

_____ a microscope?

5. If you had a dollar, would you:

_____ buy a big bag of candy

_____ buy a toy

_____ buy a book

_____ buy some fruit?

6. If you were alone, would you:

_____ dream of what you want to be when you are older

_____ read a funny book

_____ take apart small things like an old alarm clock

_____ take a nap?

7. If someone gave you a trick toy bird that would sit still for a few minutes and then wave its wings, would you:

_____ try to keep it as new as you could

_____ try to find out how it works

_____ show it to your friends

_____ play with it until it wears out?

8. If you saw a gang of kids playing a game that you did not know, would you:

_____ pay no attention to them

_____ join the gang and play although you made mistakes

_____ try to learn the rules as fast as you could

_____ tell the gang that the game is no good?

9. If you had a favorite movie star, T. V. star, or baseball star, which would you rather do:

_____ collect pictures of the star

_____ write letters to the star

_____ draw pictures of the star

_____ find out all you could about his or her successes and failures?

10. If on your way to school you saw a strange bird, would you:

_____ forget about it

_____ try to identify it by guessing

_____ try to identify it by comparing it with pictures

_____ ask your teacher what it is?

11. If someone said that he had a counterfeit dollar bill, would you say:

_____ "I don't believe it."

_____ "It looks like any other dollar bill."

_____ "Let me feel it."

_____ "Let's look at it and a real one under a reading glass."

12. If something you did not understand were mentioned in class, would you:

_____ look it up in a book

_____ wait for someone else to report on it

_____ let it go until it came up again

_____ hope the teacher would clear it up?

13. If you were grown up, would you want to be:

_____ a teacher

_____ a clerk in a store

_____ a farmer

_____ a detective?

14. If you had a hard arithmetic problem to work, would you:

_____ prefer to do something else

_____ do your other school work and then work on it

_____ try to solve it at once

_____ get angry at the teacher?

15. If the following programs appeared on different channels at the same time would you select:

_____ an old movie

_____ a televised lesson

_____ Amos and Andy

_____ This is Adventure?

16. If you found a strange insect, would you:

_____ step on it

_____ pay no attention to it

_____ call others to see it

_____ watch and see what it would do?

17. If you went to the library to get a book would you select:

_____ A Child's True Facts About the Moon

_____ Dale's Dream About His Trip to the Moon

_____ The Story of the Man in the Moon

_____ A Book of Poems about the Moon?

18. If you had to do one of the following, which would you select?

_____ learn a poem by heart

_____ find answers to questions

_____ paint pictures for social studies

_____ study spelling?

19. If you had enough money to travel, which would you like to visit first:

_____ countries in Europe where English is spoken

_____ cities in Asia

_____ the upper part of the Congo River in Africa

_____ countries in Europe where languages other than English are spoken?

20. If you found a secret message, would you:

_____ look at it and let it go

_____ consider secret messages foolish

_____ try to read the message

_____ copy down the message?

21. If you were given a jig-saw puzzle for Christmas, would you:

_____ work with it until you put it together

_____ put some of it together and then give up

_____ pay no attention to the puzzle

_____ trade it for another toy?

22. If you were invited to go fishing, would you:

_____ try to find out before you left home what kind of bait the fish were biting on

_____ buy some bait from a store

_____ dig up worms and hope to catch something

_____ take whatever kind of bait your friend told you to take?

23. If you were out of school, would you want to:

_____ keep the books in a store

_____ hunt for new minerals

_____ work in a library

_____ serve the passengers on an airplane?

24. If you had a dime to spend, would you:

_____ buy a grab bag that could have anything worth 1¢ to 50¢ in it

_____ buy a toy that had been in the window a week

_____ buy a piece of candy

_____ buy a pencil?

25. If your class were going on a field trip, would you like to go:

_____ to have a chance to move around

_____ because you like to go any place

_____ because you want to find out about things

_____ in order to talk with your friends?

26. If you were in a room with all kinds of maps, would you look first at maps of:

_____ your city

_____ the routes to a nearby city

_____ the USA

_____ the ancient world?

27. If you were studying history, would you enjoy most:

_____ finding out why an event took place

_____ learning dates

_____ learning the names of people

_____ studying for tests?

28. If you were on a trip to a cave with your class would you:

_____ carry a flashlight for safety's sake

_____ enjoy the company of your classmates

_____ carry a sweater and an extra bit of food with you

_____ try to find out as much as you could about the cave?

29. If someone brought an Indian belt to school and said the figures told a story if you knew Indian sign language, would you:

_____ take his word for it

_____ look at the belt carefully

_____ try to draw some of the figures

_____ find a book with Indian sign language and try to read the story?

30. If you were handed a strange piece of fruit similar to the one a friend of yours was eating, would you:

_____ refuse to eat it

_____ take it home with you

_____ give it back to your friend

_____ try it?

31. If you heard that there was going to be a shower of falling stars at eleven o'clock in the evening, would you:

_____ accept the statement as true

_____ forget about it

_____ ask your parents about it

_____ ask your parents to help you stay up so you could see it?

32. If someone gave you a strange stamp, would you first:

_____ put it in a book

_____ throw it away

_____ examine it for small mistakes in printing

_____ ask the name of the country from which it came?

33. If your father and mother were fixing something around the house, would you:

_____ complain if they wanted you to help

_____ find out how they did the job

_____ skip out before you had to help

_____ help, but do it so they would ask you to go somewhere and play?

34. If you heard a strange noise, would you:

_____ run away as fast as you could

_____ invent a make-believe story about the noise

_____ try to find out what caused the noise

_____ pretend you didn't hear the noise?

35. If you were going to trap an animal, would you:

_____ set your trap where you thought the animal should be

_____ watch for signs of the animal before setting a trap

_____ first read about the animal in a book

_____ set traps at any hole you found?

36. If you were given a puppet, would you:

_____ pull the strings to see the legs and arms work

_____ spend enough time to learn how to make the parts work well

_____ forget about it because the strings got mixed up too easily

_____ ask someone to work it for you?

37. If you were at home and the mailman came, would you:

_____ wave at him

_____ rush to the mailbox to see what he brought

_____ leave the mail in the box

_____ ignore the mailman?

38. If you heard that your friend had lost his lunch money, would you:

_____ look for a little while and then give up

_____ tell him you were sorry

_____ look and look until you found the money

_____ lend him enough to buy his lunch?

39. If you were given a finger printing set, would you:

_____ play cops and robbers

_____ try to find prints that were left on objects

_____ find out how it works

_____ show the set to your teacher?

40. If you and your parents did not agree about something, would you:

_____ try to make them change their minds

_____ conclude that you must be wrong

_____ conclude that your parents were wrong

_____ try to find the facts about the matter?

41. If you were asked how sugar is produced, would you:

_____ tell what you know

_____ say you do not know

_____ ask where the person asking the question thought it came from

_____ go to a book and find out?

42. If you saw a cross-word puzzle in the newspaper, would you:

_____ turn the page

_____ think it was silly

_____ try to work it out

_____ wait until the next day to see the answers?

43. If you heard a strange sound coming from your back yard, would you:

_____ wait for the sound to stop

_____ go to see what was making the noise

_____ ask your parents what it was

_____ close the window to keep the sound out?

44. If a new child moved into your neighborhood, would you:

_____ continue to play with your friends and ignore the new neighbor

_____ leave your friends and make friends with the new neighbor

_____ try to find out what the new neighbor is like

_____ stay away from the new neighbor?

45. If you saw a pile of leaves moving up and down, would you:

_____ walk away from it

_____ throw rocks at it

_____ think the wind was blowing the leaves

_____ find out what was making it move?

46. If someone showed you an amazing trick, would you:

_____ ask the person to show you how to do the trick

_____ tell the person that you can do better tricks

_____ enjoy the trick and then forget it

_____ think the person had a magic power which you did not have?

47. If you were at the sea shore, would you:

_____ catch as many sea creatures as possible

_____ make castles in the sand

_____ dig holes in the sand

_____ watch the sea creatures to see how they live?

48. If you were coming to the end of an interesting story and your friends were outside asking you to come out and play, would you:

_____ drop your book.

_____ tell your friends that you would join them later and finish reading

_____ mark your place

_____ ask them where they would be later?

49. In science class would you prefer:

_____ to learn to spell the names of animals

_____ to give reports on your readings

_____ to do experiments to find answers to questions

_____ to look up answers to questions in your books?

50. If you went to a dog show and one of the dogs was behind a sign marked "SAMOYEDE," would you:

_____ think the name was wrong

_____ write it down and look in an encyclopedia to see if there was such a dog

_____ notice carefully what the dog looked like

_____ forget about it?

51. If you belonged to one club and some of your classmates belonged to another, would you:

_____ pretend you did not know about the other club

_____ try to find out what they did in the other club

_____ keep them from finding out what you did

_____ tell them that your club was the better club?

52. If your mother bought you a new coat that the salesman said was made from coal, would you:

_____ laugh at him

_____ feel the coat

_____ ask him how the coat was made

_____ think you had something special?

53. If you had coins in a bank, would you:

_____ take them out and play with them

_____ stack them into piles

_____ see how many coins you had

_____ look at the date on each coin?

54. If you were going to build a shack and had no money for lumber, would you:

_____ keep looking until you found enough scrap lumber

_____ keep begging your father for enough money

_____ give up the project

_____ plan to build the shack later when you had enough money?

55. If you were reading a book that was a mystery story and you had to leave your book for a few days, would you:

_____ mark your place and return to it

_____ peek in the back and see how the story was coming out

_____ stop where you were reading and not read the book again

_____ put the book back where you got it?

56. If you were told to go to the library and pick out any book you wanted, would you pick one that:

_____ had pretty pictures in it

_____ was written by someone whose books you had read before

_____ was easy to read

_____ told you how magicians did their tricks even if it were hard to read?

Name________________________ School_______________________ Date________

Room________________________

WHAT DO YOU KNOW?

All pupils learn many facts as they grow older. Although some of the facts are learned in school, a large number of them are gathered from other places. Often one finds out about things by using encyclopedias or other reference books. Of course, all pupils will not learn the same information this way. Some will know the answers to one set of questions; other pupils will know the answers to others. Answers to all of the items below could be found in encyclopedias or reference books. How many of these items do you know? Mark an X in front of the correct ending for each item.

1. Clara Barton

______made the first American flag

______discovered the white potato

______wrote the music for the song "America"

______founded the American Red Cross.

2. The president of the United States who was once a surveyor was

______Herbert Hoover

______Franklin Roosevelt

______George Washington

______U. S. Grant.

3. Whales are large animals. Some of them are more than

______25 feet long

______50 feet long

______75 feet long

______100 feet long.

4. Ceylon is an island off the coast of

______Africa

______Asia

______South America

______Europe.

5. Marie Curie was

_____a great scientist

_____a famous actress

_____a singer of folk songs

_____a Red Cross nurse.

6. According to legend, the wooden horse of Troy contained

_____gifts for the goddess Athena

_____Greek soldiers

_____two large sea serpents

_____fire which destroyed the city of Troy.

7. The biggest bell in the world is

_____the Liberty Bell in Philadelphia

_____an ancient bronze bell in Japan

_____the great bell of Moscow in Russia

_____a cast iron bell in China

8. The junco is a

_____club used for hunting in Australia

_____kind of mouse living in India

_____common winter bird living in the United States

_____group of people who study together.

9. The Bessemer furnace is used to

_____refine gold

_____make soap

_____turn iron into steel

_____make lime.

10. Kremlin is

_____the fortified part of a Russian city

_____the place where the American Congress meets

_____a stiff material used to make skirts stand out

_____a book of fairy stories.

11. The humped cattle of India which have been brought into the United States are the

_____zebus

_____buffaloes

_____bison

_____yaks.

12. The diet of the vampire bat of Central and South America consists of

_____tropical insects

_____the nectar of flowers

_____warm blood

_____tropical fruits.

13. Joan of Arc

_____was beheaded by Henry VIII of England

_____was burned at the stake

_____died in battle

_____was accidentally shot by a French soldier.

14. The highest mountain in the world is

_____Mount Everest

_____Mount Vernon

_____Mount Blanc

_____Mount Washington.

15. A loadstone is

_____an iron ore that is magnetized

_____a rock used to hold down a load going down hill

_____a weight used to measure loads of earth

_____a material that is found in the body and must be removed.

16. Delaware is called the First State or the Diamond State; Maine is called the

_____Lighthouse State

_____Lobster State

_____Harbor State

_____Pine Tree State.

17. Victoria Falls are located on the

_____Indus River

_____Nile River

_____Rhodesia River

_____Zambesi River.

18. A big old walrus may weigh as much as

_____6000 pounds

_____3000 pounds

_____750 pounds

_____400 pounds.

19. Groundhog is the common name for the

_____woodchuck

_____woodcock

_____the guinea pig

_____the rooting hog of Australia.

20. Venus is a planet that was named for a goddess. Of the planets, it is the

_____closest to the sun

_____farthest from the sun

_____second closest to the sun

_____farthest from the earth.

21. A Hottentot is

_____an African

_____an Indian

_____a city

_____a cannon.

22. Juliana is

_____the queen of the Netherlands

_____a famous movie star

_____a French actress

_____ambassador to Sweden.

23. The Kookaburra is

_____a small donkey

_____a national park

_____a mountain in eastern New Mexico

_____a bird that lives in Australia.

24. Water is made up of

_____hydrogen and oxygen

_____oxygen and carbon dioxide

_____nitrogen and oxygen

_____oxygen and carbon.

25. Queen Victoria was

_____the queen who helped Columbus

_____a queen of England in the 19th Century

_____the first queen of France

_____the only English queen who did not marry.

26. The wife of John Adams was a person of great ability. Her name was

_____Abigail

_____Audrey

_____Alice

_____Aletha.

27. "Stonewall" Jackson

_____was president of the United States

_____was killed by an Indian brave

_____led the American forces at the Battle of Bunker Hill

_____was a Confederate general in the Civil War.

28. Cymbals are brass musical instruments which are struck together to produce sounds. They have been in use since

_____centuries before Christ

_____the American Revolutionary War

_____the American Civil War

_____World War II

29. Copernicus was

_____a famous Roman general

_____the inventor of the wheel

_____the astronomer who declared that the earth revolved around the sun.

_____the artist who painted the pictures on the walls of the Great Pyramid.

30. Gilbert Stuart was

_____a wicked king of France

_____an admiral in the U. S. Navy

_____an early American portrait painter

_____the discoverer of uranium.

31. The United Nations is an organization of nations that works for peace in the world. Its meeting place is

_____Paris, France

_____London, England

_____Washington, D. C.

_____New York City.

32. A boy or girl who can do addition problems quickly might be called a good adder. Adder is also the name of a

_____dog

_____fish

_____snake

_____horse.

33. Alaska was purchased from

_____Canada in 1898

_____Russia after World War I

_____Canada in 1695

_____Russia after the Civil War.

34. A pint is equal to

_____one cup

_____two cups

_____two and one-half cups

_____four cups.

35. A diamond is made of

_____oxygen

_____hydrogen

_____nitrogen

_____carbon.

36. Roentgen

_____developed the first electric motor

_____was a famous sculptor

_____discovered X-rays

_____discovered the art of grafting.

37. A loom is used

_____in making cloth

_____in grinding wheat

_____in mining coal

_____in baking bread.

38. An object that looks green to us

_____reflects all light rays except the green ones

_____reflects no light rays

_____reflects yellow and blue light rays

_____reflects only green light rays.

39. Maize is another name for

_____rice

_____wheat

_____barley

_____corn.

40. Glass is made from

______water and coal

______sand

______limestone

______clay and oil.

41. Flax is the plant that gives us

______cotton

______rayon

______linen

______rope.

42. A lunar month consists of

______27½ days

______28 days

______30 days

______31 days.

43. To square a number you must

______divide it by two

______multiply it by itself

______multiply it by two

______add it to itself and subtract one,

44. Typhus is

______a kind of a mosquito

______a tropical plant

______an infectious disease

______a small mammal.

45. Asters are flowers that bloom in the

_____fall

_____early spring

_____late spring

_____summer.

46. The submarine is a vessel that travels under water. It was first used during the

_____Revolutionary War

_____Civil War

_____Spanish-American War

_____First World War.

Name________________________________ School______________________ Date__________

Room________________________________

THE TRIP TO THE ZOO

(READ THE FOLLOWING STORY AND ANSWER THE QUESTIONS AT THE END OF IT.)

The members of the class had been to the zoo. Miss Smith, their teacher, had told them that they would have to write a report about their trip. One of the pupils wrote the following report.

"We got on the bus early Tuesday morning. It was a beautiful morning and we all enjoyed our two-hour trip to the zoo. We sang songs all the way.

Our first stop was at the monkey house. Some of the animals were little and cute. Others were big and ugly. In one cage, there was a gorilla that stood up and pounded his chest. He was very, very big. One monkey was a little fellow whose eyes and ears looked to be as big as he was. He was called the Bush Baby of Africa. One little animal called a ruffed lemur was reddish brown and was eating insects. There was a spider monkey that had a tail that was twice as long as its arms.

Our next stop was at the lion house. There were really all kinds of cats in this house. There was one animal that the sign said had a mother that was a tiger and a father that was a lion. It was called a liger. There was a red lynx that looked so much like my own 'Tabby' that I wanted to pet it. They were feeding the lions and the lions were making a lot of noise. The lion is sometimes called the king of beasts. One fierce-looking animal is the jaguar. It can be found in the southern part of the United States. The guide told us that this animal had killed a horse and had eaten most of it. It could kill a man, but it had been captured after a small dog ran it up a tree.

On the way to the house where the water animals are kept, we stopped to watch the keepers throw fish to the seals. Seals can get sunburned easily and can't lie too long exposed to the sun, even if they are lying on ice. They made a lot of noise like a honking bus.

The largest creature at the water-animal house was a shark. It looked as if it were grinning all the time. Our teacher said that she had read that the shark is the only animal that never sleeps or rests. If that is true, sharks must get very tired. The class asked the guide why the zoo did not have a whale. He said that whales are too large. They need lots of room to play since they like to jump out of the water. Sometimes they jump twenty feet into the air.

At one end of the water-animal house there was an alligator pit. Some people said that the animals were crocodiles. I can't tell the difference. They are both ugly. We also saw some strange snakes and frogs. In one cage there was a rattle snake and in another a boa constrictor. The boa constrictor was large enough to swallow a pig. In one cage, there were frogs. One little frog from West Africa had hair instead of smooth skin. It looked funny. While I was watching it, I thought I heard someone in the class whistle. It was then that I saw the whistling frog. It wasn't much larger than a green frog and was trying to catch flies with its long tongue. It caught some flies, but many got away. The guide told us that flies have 8000 eyes, but they cannot see very well.

The guide told us that some animals need a lot of water. Even camels drink water when it is around. The guide said he had never seen a prairie dog drink water. The prairie dogs lived in little burrows and kept coming out, looking around and then scampering into their holes. The guide also told us about the Koala Bear from Australia that gets its water by eating plants when they are covered with dew.

There are several strange animals from Australia. The kangeroo carries its babies in a pouch. It has to do this because a baby kangeroo is about the size of a postage stamp. Kangeroos can be trained to box and grow to be very large.

We then went to eat. Outside of the shelter, wasps had left some of their work. It looked like paper. Miss Smith told us that paper had been made by wasps before people learned how to make it. She also said that we got the different things we were eating from different parts of the world. One of the students had corned beef from South America. I had tapioca pudding. Miss Smith said that tapioca came from a root that is deadly poison. I like tapioca just the same.

After lunch we went to see the birds. The big two-toed ostrich was looking all around. It has big tail feathers. We have a picture of my great grandmother wearing a hat trimmed in ostrich feathers. The prettiest bird we saw was a peacock. It had spread its wings into a beautiful fan of many colors.

The guide told us that this was the way the peacock called its mate. The guide also told us about a Bower Bird that builds a nest of flowers for his mate. He also told us about a woodpecker finch that uses a stick to pry insects from wood.

Some birds can sing and others cannot. The stork cannot make any sound except by banging its beak together. The woodcock sings with its wings as prettily as a canary does with its throat. Another bird, the finfoot, growls like our dog Rex.

Animals that have no voices 'talk' with other animals. Bees 'talk' with other bees by dancing in the air. Giraffes 'talk' with their tails. Other animals can make many sounds. There was a crow at the zoo who kept shouting, 'Who are you?'

In one cage, there were many little humming birds. They seemed to be moving very fast. Some of them were flying backward. Our guide told us that birds are fast animals. The road runner can run faster than a horse and a sea bird, the Frigate bird, can fly faster than 250 miles per hour.

We visited a section of the zoo where they had animals that looked like horses. We all enjoyed watching the zebras run about. Someone said they looked like prisoners in stripes. In the next section, there was a tiny donkey with shaggy hair. It looked like a big dog. The sign said it was from India.

One of the children told about riding a burro to the bottom of the Grand Canyon. Our guide said that animals of this kind were used all over the world. He said that on one island they made donkeys wear trousers on the street. Miss Smith laughed and said she saw elephants when she was in Ceylon that were dressed in lace trimmed pants.

As we were getting on our bus to come home, a dog was chasing a squirrel. The squirrel ran up the tree. Did you know that a squirrel can climb a tree faster than it runs on the ground? I didn't.

I had a good time on my trip to the zoo."

1. DID YOU LIKE THIS STORY? YES NO

2. WHAT DID YOU LIKE ABOUT THE STORY?

5

Name__________________________ School__________________ Date________

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QUESTIONS ABOUT THE TRIP TO THE ZOO

Not so long ago, you read a story about a trip to the zoo. Below are statements about that story. Some of the statements are exactly what was said in the story. Put an X in front of them. Other statements are not exactly what was said in the story. Put an 0 in front of them.

_____ 1. The class went to the zoo on Tuesday.

_____ 2. The trip to the zoo was one-hour long.

_____ 3. A big ugly ape pounded his chest.

_____ 4. The class saw a small big-eyed monkey called a Bush Baby.

_____ 5. The spider monkey has a very short tail.

_____ 6. A liger has a mother that is a tiger and a father that is a lion.

_____ 7. A red lynx looks like a big house cat.

_____ 8. The jaguar is found in the United States.

_____ 9. The jaguar will fight and kill all domestic animals such as the horse and dog.

_____10. Seals have very tough skin that protects them from freezing and getting sunburned.

_____11. Sharks sleep by floating just under the surface of the water.

_____12. Whales are big creatures and they sometimes leap twenty feet out of the water.

_____13. Alligators and crocodiles look very much the same.

_____14. A rattle snake can swallow a pig.

_____15. All frogs are covered with smooth, hairless skin.

_____16. Some frogs can whistle.

_____17. The housefly has 8000 eyes.

_____18. Camels drink water when they can get it.

_____19. The zoo keeper has to give prairie dogs a lot of water or they will die.

_____20. The Koala Bear gets water by eating leaves covered with dew.

_____21. Baby kangeroos are smaller than postage stamps.

_____22. Human beings were the first creatures to make paper.

_____23. Tapioca is made from a poisonous root.

_____24. The ostrich has two toes.

_____25. Ostrich feathers were once used to trim hats.

_____26. The prettiest bird that the class saw was the Lower Bird.

_____27. The woodpecker finch makes a nest of flowers for his mate.

_____28. The finfoot uses a stick to pry out insects.

_____29. The stork sings a beautiful song.

_____30. The woodcock sings with his wings.

_____31. Giraffes "talk" with their tails.

_____32. Hummingbirds can fly backwards.

_____33. There are no birds that can run as fast as dogs and horses.

_____34. The Frigate bird can fly faster than 250 miles per hour.

_____35. In India there is a shaggy donkey that looks like a big dog.

_____36. At the zoo there were donkeys that wore trousers.

_____37. The teacher said she had seen elephants with lace pants in Ceylon.

_____38. A squirrel can climb a tree faster than it can run on the ground.

_____39. The teacher's name was Miss Smith.

_____40. The pupil had a good time at the zoo.

Name____________________ School__________________ Date__________

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WHAT I THINK

Directions: Listed below are what some person did or what he or she usually does. There is no wrong answer for any item. Mark in front of the answer that tells what you think of it. The best answer is the one that tells what you think. Mark' with an X.

1. Looked inside another person's new lunch box.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

2. Asked why the nurse came and looked at the children's throats.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

3. Took the jumping jack apart.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

4. Is always looking for new things.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

5. Opened the closet door to see what was inside.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

6. Does not ask questions but waits for others to tell what they want to tell.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

7. Often reads books because of the pictures on the cover.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

8. Makes up his or her mind quickly on almost everything.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

9. Is curious about many things.

   ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

10. Spends a lot of time tinkering with old radios.

    ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

11. Takes things apart to see how they work.

    ___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

12. Often uses the dictionary to look up new words.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

13. Explores vacant buildings.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

14. Likes to puzzle over strange things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

15. Sometimes doubts what other people say.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

16. Gets big-eyed over new things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

17. Picks up strange things and examines them.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

18. Often asks questions.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

19. Often peeks into boxes and bags.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

20. Looked to see how a new fountain pen works.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

21. Watched from the window as new neighbors moved into the house next door.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

22. Believes almost everything he or she hears.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

23. Wants to know what other people are doing and thinking.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

24. Is interested in many things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

25. Asks if there are other ways of doing things.

___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

26. Is interested in things that other people hardly notice.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

27. Wants to see things before believing them.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

28. Asked the neighbor why he was digging a hole by the side of his house.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

29. Finds out about new games and tries them out.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

30. Makes up toys and gadgets out of old materials.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

31. Tries to fix broken toys and tools.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

32. Often answers newspaper and magazine ads in order to see what they mean.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

33. Likes to wander around the neighborhood to see what is new.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

34. Is always looking for a new way to do things.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

35. Likes to tinker with new gadgets.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

36. Likes to ask people to prove what they are saying.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

37. Likes to discover uses for new materials found in art class.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

38. Stays around where people are working just to watch what they are doing.
___Very Good ___Good ___Neither Good Nor Bad ___Bad ___Very Bad

39. Likes to sit and figure out why things happen as they do.
Very Neither Good Very
___Good ___Good ___Nor Bad ___Bad ___Bad

40. Spends a lot of time looking for new things to do.
Very Neither Good Very
___Good ___Good ___Nor Bad ___Bad ___Bad

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WHICH SAYING DO YOU BELIEVE?

All of you have heard many old sayings. If you stop to think of what they mean, you find that some are opposite to others. Below are listed pairs of sayings. Please mark the one of each pair that you believe is most nearly true most of the time.

1. _____ Where there's a will, there's a way.

_____ What can't be cured must be endured.

2. _____ The grass is greener on the other side of the fence.

_____ Every bird likes its own nest best.

3. _____ He who hesitates is lost.

_____ All in good time.

4. _____ Don't bite off more than you can chew.

_____ Anything is possible.

5. _____ It will all come right in time.

_____ Have you something to do tomorrow, do it today.

6. _____ Dare to follow the truth.

_____ Don't rock the boat.

7. _____ Practice makes perfect.

_____ Take the line of least resistance.

8. _____ Never say die.

_____ Better go back than lose yourself.

9. _____ Curiosity killed the cat.

_____ Knowledge is power.

10. _____ It pays to take a chance.
_____ Keep to the safe and sane.

11. _____ Fortune favors the brave.
_____ It's better to be a live coward than a dead hero.

12. _____ Think for yourself.
_____ Follow the wise leader.

13. _____ Ignorance is bliss.
_____ Only the wise can see the true beauty of life.

14. _____ Let well enough alone.
_____ Nothing like trying.

15. _____ Make sure you're right, then go ahead.
_____ Strike while the iron is hot.

16. _____ What you don't know won't hurt you.
_____ The truth will make you free.

17. _____ All things come to him who waits.
_____ Who stands still in the mud sticks in it.

18. _____ Don't change horses in the middle of the stream.
_____ It's never too late to change.

19. _____ Stay with the tried and true.
_____ Be not the last to lay the old aside.

20. _____ A bird in the hand is worth two in the bush.
_____ He deserves little who fears to take a chance.

21. _____ You don't know what you can do until you try.
_____ Never start a thing you can't finish.

22. _____ Never put off till tomorrow, what may be done today.
_____ Time cures all things.

23. _____ Keep the common road and be safe.
_____ The best view is from the heights.

24. _____ What is mine will come to me.
_____ Nothing venture, nothing have.

25. _____ A bird in the hand is worth two in the bush.
_____ Coins in a locked box earn no interest.

26. _____ If at first you don't succeed, try, try again.
_____ All things come to him who waits.

27. _____ Right doing comes from right thinking.
_____ Ignorance is bliss.

28. _____ Look before you leap.
_____ He who hesitates is lost.

29. _____ Dare to follow the truth.
_____ It is better to be safe than sorry.

30. _____ He who acts on impulse, seldom wins a prize.
_____ Seize the opportunity when it presents itself.

31. _____ Much can be won by patient waiting.
_____ Nothing venture, nothing have.

32. ____ A new broom sweeps clean.
____ Be not the first by whom the new is tried.

33. ____ Let well enough alone.
____ Never do things by halves.

34. ____ It's never too late to change.
____ You can't teach an old dog new tricks.

35. ____ First study, then act.
____ First thoughts are brilliant.

36. ____ Dare to be right, dare to be true.
____ Let sleeping dogs lie.

37. ____ Be good, and let who will be clever.
____ Seek knowledge so you may act wisely.

38. ____ Reach for the stars.
____ Don't bite off more than you can chew.

39. ____ Keep your nose to the grindstone.
____ Take the line of least resistance.

40. ____ Press ever onward, ever upward.
____ Stay on the beaten path.

41. ____ Second thoughts are wise.
____ The quick answer is usually the right answer.

42. ____ Be content with things as they are.
____ Dare to be right, dare to be true.

Name________________________ School____________________ Date__________

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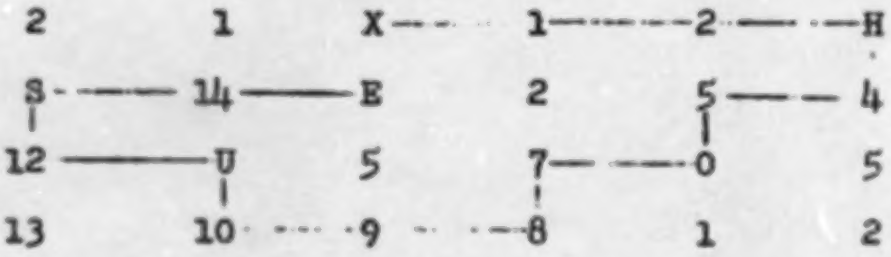
RIDDLE PATH PUZZLES I

Below, you are given a number of riddles. You may guess the answers. If you want to know whether your answer is right, you can find out by solving the puzzle that follows each riddle.

You solve each puzzle in the following way:

1. Start at X.
2. Connect numbers as if you were counting 1, 2, 3, 4, etc.
3. Don't skip any numbers.
4. Don't go to smaller numbers.
5. You may move up, down, left or right (never diagonally).
6. At any point you may use the letter you run into in place of a number. For example, if you were connecting 1, 2, 3, 4, 5, 6 and after 4 you ran into G you would connect 1, 2, 3, 4 G, 6. The G would take the place of the 5.
7. If you connect the letters together in the right way, you will spell out the answer to the riddle.

Example: Suppose you guessed the answer to a riddle to be HOUSE. You would write HOUSE in the space under the riddle. Then, if you wanted to be sure, you would solve the puzzle as it is shown.



Be careful, there may be some letters that do not belong in your word.

There are no zero's in the puzzle. They are the letter O.

Now try these.

1. "Acts like a kitten, looks like a kitten, but isn't a kitten." What is it?____________________________

X	1	2	3	4	5
1	0	4	C	3	1
3	4	6	5	2	W
2	3	7	A	1	2
4	2	T	9	5	4

2. "Riddle me, riddle me, what is that?
Over the head and under the hat."

What is it?___________________________

P	6	5	N	3	2	1	X
12	11	10	9	4	3	2	1
11	12	K	8	H	6	5	2
12	A	10	9	16	5	4	3
13	14	15	I	17	4	3	E
14	15	12	17	2	3	4	5
T	13	14	18	19	20	21	R

3. "Crooked as a rainbow
Slick as a plate
Ten thousand horses
Can't pull it straight."

What is it?____________________

1	X	3	4	K	6	7	8
2	1	R	3	4	5	6	H
3	4	3	6	I	6	5	6
L	5	F	7	15	11	12	13
5	6	5	8	9	10	9	14
26	25	24	23	E	17	16	V
R	25	23	20	19	15	16	N
28	26	22	21	18	L	15	13

4. "It isn't in
And 'tisn't out
And the house
Can't do without."

What is it?________________________

6	5	4	3	2	1	X	1	2	3	4	5	6
7	6	5	4	3	3	1	2	3	4	5	6	7
8	9	6	5	4	4	2	3	4	5	6	9	8
9	11	N	14	15	D	3	D	15	14	C	11	9
10	9	12	W	22	17	4	17	22	F	12	9	10
11	7	11	20	19	0	5	E	19	20	11	7	11
12	11	I	9	8	W	6	A	8	9	B	11	12

5. "Patch upon patch, without any stitches,
Riddle me that, and I'll buy you a pair of britches."

What is it?______________________________

1	X	1	2	F	4	5
2	1	10	9	E	7	6
4	2	11	N	9	14	15
4	C	2	11	12	B	16
A	12	11	10	9	8	17
6	7	8	9	20	19	18
E	30	A	22	B	18	D
28	G	24	13	14	15	16
27	26	25	14	E	16	R

Name____________________________ School_____________________ Date________

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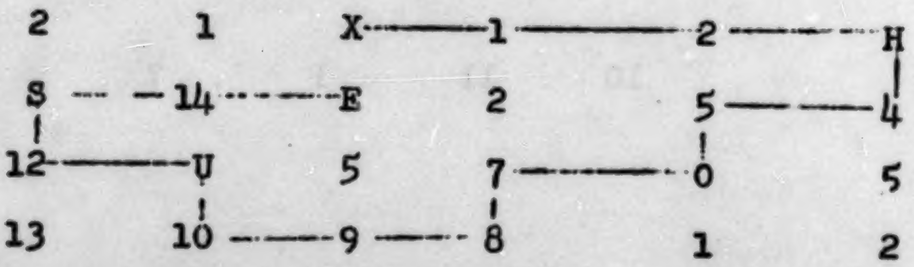
RIDDLE PATH PUZZLES II

Below, you are given a number of riddles. You may guess the answers. If you want to know whether your answer is right, you can find out by solving the puzzle that follows each riddle.

You solve each puzzle in the following way:

1. Start at X.
2. Connect numbers as if you were counting 1, 2, 3, 4, etc.
3. Don't skip any numbers.
4. Don't go to smaller numbers.
5. You may move up, down, left or right (never diagonally).
6. At any point you may use the letter you run into in place of a number. For example, if you were connecting 1, 2, 3, 4, 5, 6 and after 4 you ran into G you would connect 1, 2, 3, 4, G, 6. The G would take the place of the 5.
7. If you connect the letters together in the right way, you will spell out the answer to the riddle.

Example: Suppose you guessed the answer to a riddle to be HOUSE. You would write HOUSE in the space under the riddle. Then, if you wanted to be sure, you would solve the puzzle as it is shown.



Be careful, there may be some letters that do not belong in your word.

There are no zero's in the puzzle. They are the letter O.

Now try these.

1. "A house full, a yard full,
But you can't get a spoonful."

What is it?____________________

4	3	2	1	X	1
3	T	3	5	H	2
A	5	4	6	9	R
7	8	5	10	13	14
2	9	10	11	I	7

2. **"What is round on the ends and high in the middle?"**

____

7	8	L	X	1	2	3
6	0	8	1	2	3	4
7	4	3	2	7	L	E
8	13	14	15	16	9	6
9	12	29	0	17	20	21
10	11	28	17	18	19	H
B	10	27	26	I	24	23

3. "Crooked as a ram's horn,
Teeth like a cat
Guess all your lifetime
You'll never guess that."

What is it?____________________

20	19	18	E	2	1	X	1
21	14	15	16	U	18	1	2
22	13	S	5	B	3	2	3
23	12	7	6	7	32	33	34
24	I	10	9	R	31	R	35
25	12	T	30	31	32	32	36
26	27	28	29	25	R	38	A

4. **"I know something:
Holes all around
Holes in the middle
Yet still holds water."**

What is it?____________________

1	X	3	5	7	6	7	8	9
2	1	2	S	4	5	8	7	10
H	6	8	A	12	14	16	12	11
6	7	9	11	13	P	14	13	10
8	30	29	N	14	16	7	8	P
10	31	E	27	16	17	18	1	8
Y	32	37	26	P	22	19	20	7
14	G	36	25	24	23	0	21	6
16	34	35	34	33	32	31	30	5

5. "Round and deep and good to keep
And you should use it once a week."

What is it?____________________________

H	4	3	2	1	X	1	2	3	B	3	2
6	A	4	3	2	A	2	3	6	5	6	A
T	20	19	18	17	T	15	14	9	T	9	8
44	43	42	19	18	17	14	13	12	11	10	9
45	B	41	B	19	18	21	22	23	H	23	22
46	55	40	39	38	19	20	3	2	25	22	U
47	54	53	36	37	T	17	T	27	26	9	B
48	51	52	35	29	31	30	29	U	5	6	7
49	50	7	U	33	32	3	2	1	9	7	A

Name____________________________ School____________________ Date________

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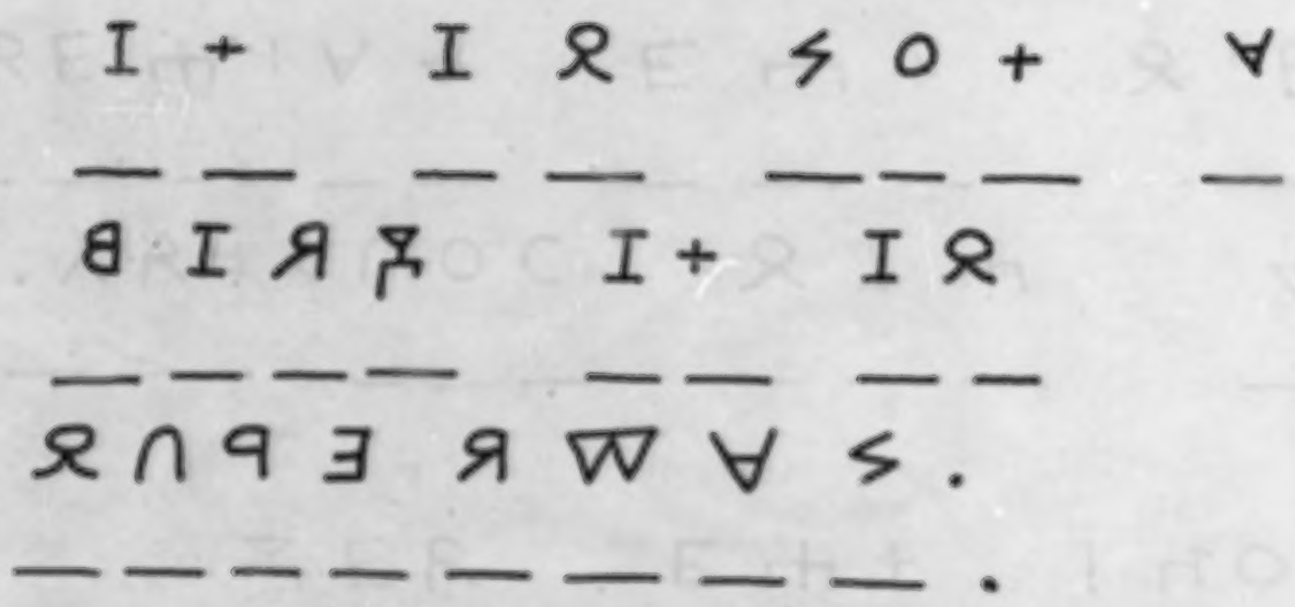
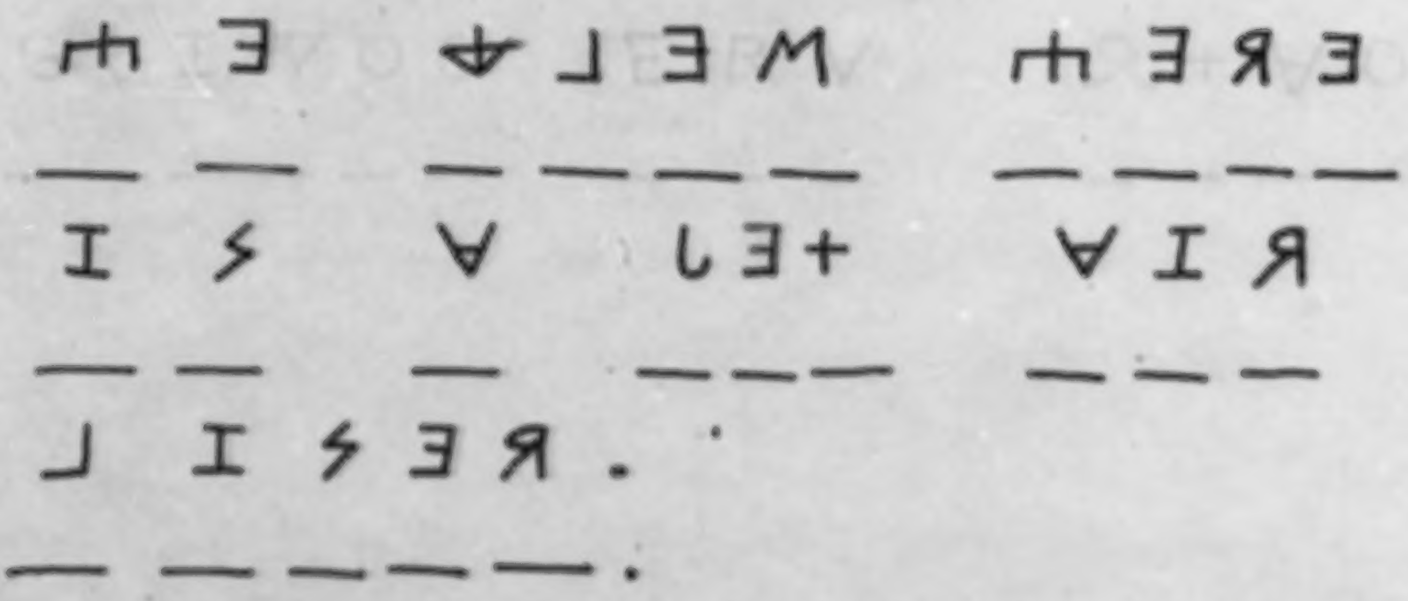
CODE PUZZLE

Can you solve the following codes? Why don't you try? You will get credit for each letter, extra credit for each word, and still more credit for each message. Each sentence really tells something. Write each letter on the line below the sign you are solving.

(1)



(2)



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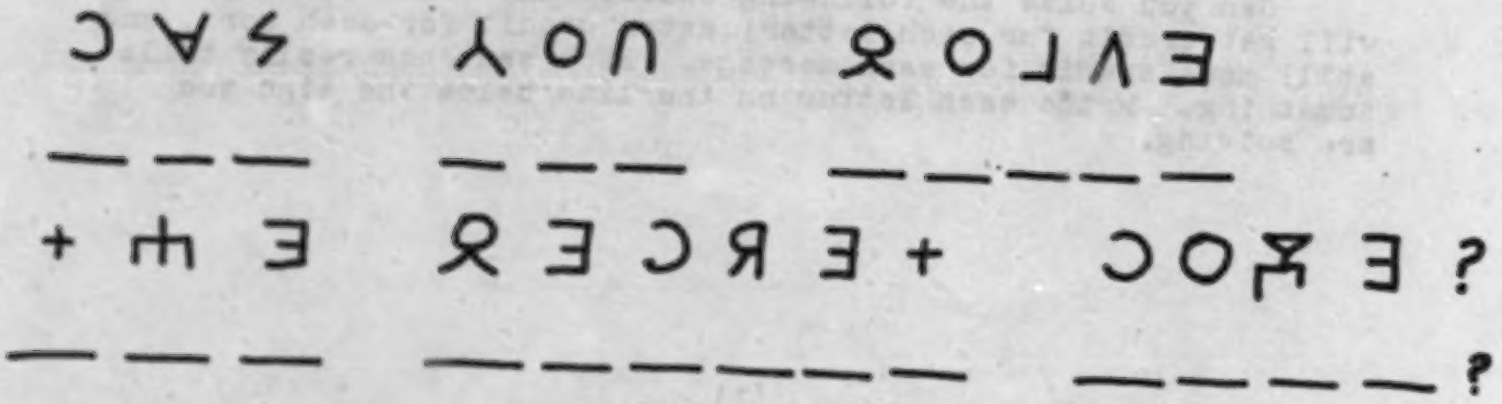
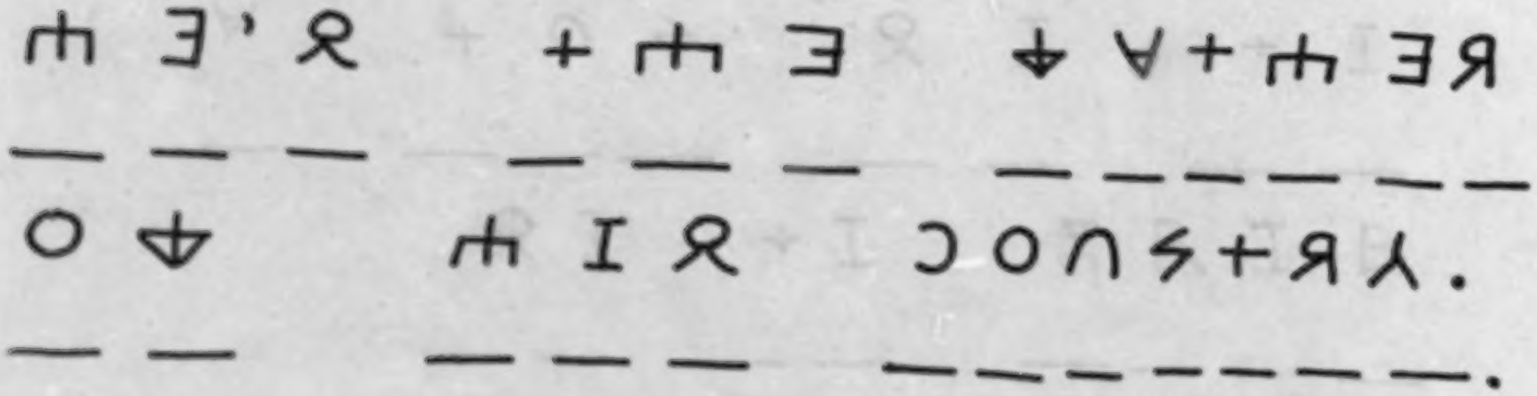


(4)



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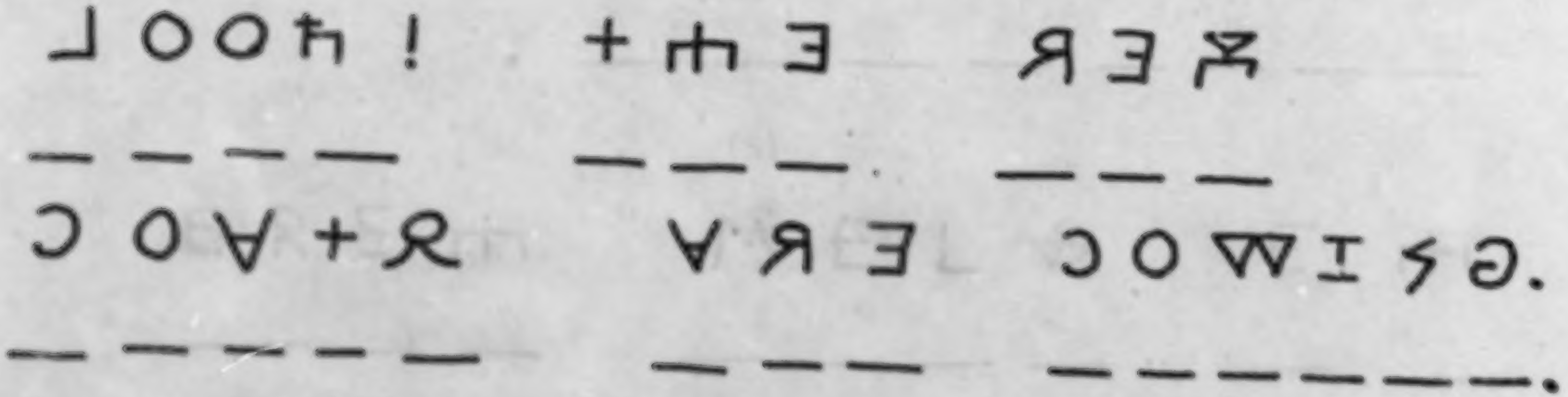

Name______________________ School__________________ Date______________

Room______________________

FOOLISH SAYINGS

Some of the following statements have parts in them that make them foolish. Other statements are all right. Put an X before the foolish ones; and a C before those that are all right.

_____ 1. Bob said to Jack, "I'll meet you at the lodge. If I get there first, I'll make a chalk mark on the door. If you get there first, rub it out."

_____ 2. He held the flashlight so I could see to change the tire.

_____ 3. Bob worked fast so he could fill the baskets before he ran out of apples.

_____ 4. The soldiers were outnumbered so they gave up without a fight.

_____ 5. A man who was charged with driving at the rate of 70 miles per hour insisted that he could not be guilty since he had been out driving for only one-half hour.

_____ 6. The sunlight pouring in through windows on all four sides of the room made such a glare that I hurried to pull the blinds.

_____ 7. If you can't read type of this size, you need glasses.

_____ 8. If you can't swim, you should learn.

_____ 9. She hurried to school so she would not be late for her first class.

_____10. If you can't open the jar, put the lid back on and place it in the refrigerator.

_____11. "There is nothing I like better than dessert," she said as she took her second piece of apple pie.

_____12. Jane wanted to call the new boy in her class, but couldn't remember his name. She called the operator and asked her to look up the boy's number.

_____13. If each of us would give ten cents, we would have enough money to buy the baseball.

_____14. There have been no girls born in my family for the past three generations.

_____15. The crowd pushed forward to see what had happened. They made it impossible for the rescue teams to work.

_____16. Abraham Lincoln once said that in his opinion Lindberg was a greater man than Napoleon.

_____17. Benjamin Franklin said, "We had better hang together or we will hang separately."

_____18. The ladder broke when my father was painting the house. Luckily he was not far from the ground when it happened, so he was not hurt.

_____19. On their trip to the fire station, none of the little children wanted to be last in line. The kind teacher solved the problem by letting the last child in line come up and walk with her.

_____20. The judge ruled that the man could not marry his widow's sister.

_____21. Russia is located 100 miles from the United States.

_____22. The teacher said to the pupil, "Write the answers to the first five questions on the blackboard. You should finish by the time I return."

_____23. Why is Sam Brown so stingy with his brother? He has so much wealth that he could give his brother half of it and still be the richest man in town.

_____24. The soldier said, "If I have to choose between spending the rest of my life in jail or in the grave, I'll choose jail."

_____25. His uncle is twice as old as my father was when I was born.

_____26. The rancher and the cattle rustler exchanged several shots before the rustler fell dead. The sheriff said that the rancher's first shot had jammed the rustler's gun.

_____27. The soldiers were outnumbered so they gave up without a fight.

_____28. My sister was in town shopping when she remembered she had to be at a meeting at 3 o'clock. She called to ask me to meet her at 2:30 and drive her to the meeting.

_____29. John wanted to be a basketball player. He practiced an hour every evening before he started his homework.

_____30. My grandparents have no daughters and no sons.

_____31. She picked up the melted ice cubes and dropped them into the pail.

_____32. She swept the rug and then rolled it to one side of the room, so the boys and girls could play games.

_____33. The breeze made the branches of the trees sway and the waves lap softly against the bank.

_____34. Helen said, "I have three sisters: Mary, Susan and myself."

_____35. Mrs. Jones mailed her order to the store. At the bottom of the order she wrote, "Please let me know if you do not receive this order."

_____36. Father said, "Come to the table and I will show you how to play the game."

_____37. The captain said, "Don't shoot until you see the white's of their eyes."

_____38. The old man climbed three flights of stairs, turned right and opened the third door from the end of the hall.

_____39. It is a week from Christmas to New Year's but almost twelve months from New Year's to Christmas.

_____40. He was such a popular child star that although he died before he was ten years old, he left enough money to make all of his grandchildren wealthy.

_____41. The teacher said, "The earth is moving at the equator almost 1000 miles per hour."

_____42. John spend half of his money, but still had more left than he had spent.

_____43. A wheel came off the car while my mother was driving. She didn't know how to put it on by herself, so she drove to the nearest station for help.

_____44. The family had taken a long vacation. They told their neighbor that they had taken over 200 pictures.

_____45. He was born in a log cabin but he became President of the United States before he died.

_____46. Give me my glasses and turn out the light so I can read the newspaper.

_____47. "I am very fond of dogs," he said as he patted the puppy's head before kicking it out of the way.

_____48. "Shoot if you must, this old gray head, but spare your country's flag," she said.

_____49. He ran quickly up the stairs and hurried down the hall. He was hoping he would be late for his first class.

_____50. A tremendous roar accompanied the thunderbolt that knocked out the power station. In the hush that followed, the only sound was the whir of the electric fan.

_____51. The first man to climb to the top of the mountain found there the remains of what was once an Indian look-out station.

_____52. The man who was stopped for speeding told the policeman that he was hurrying to reach a filling station before he ran out of gas.

APPENDIX D

Measuring Instruments Developed for the Major Study

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Name______________________________ School____________________ Date ________

Room______________________________

WHICH TO DISCUSS?

You are told that there is a story about each figure in the sets below. If you could hear only one story for each set, which one of the three signs would you select? Draw a circle around the one sign in each set you would want discussed.

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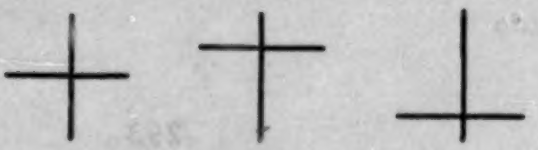

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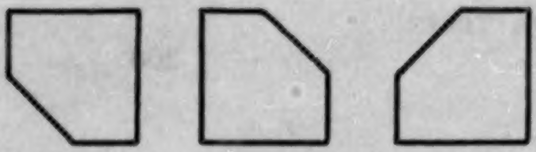

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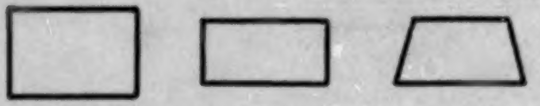

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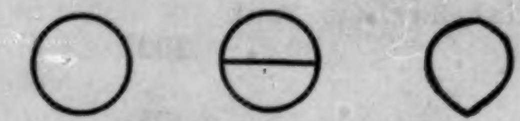

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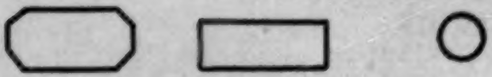

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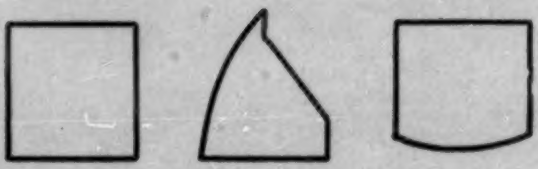

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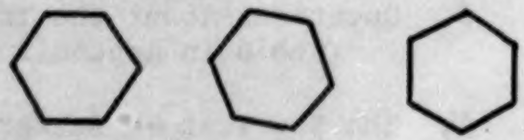

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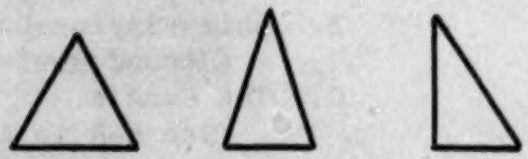

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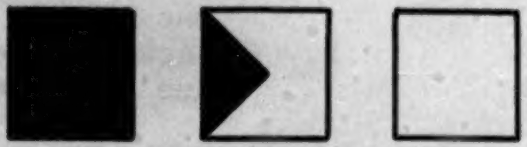

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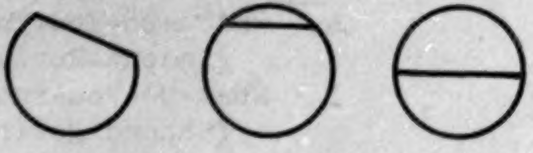

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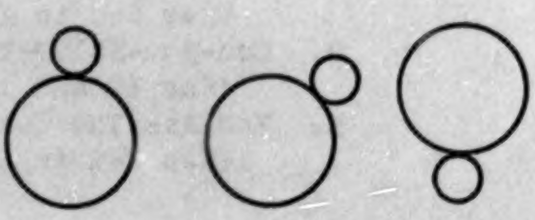

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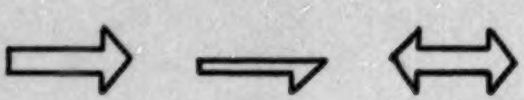

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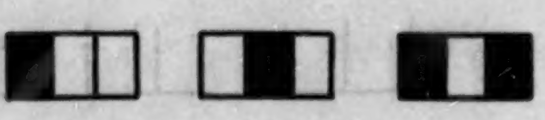

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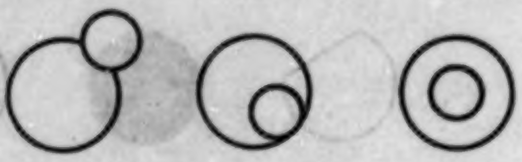

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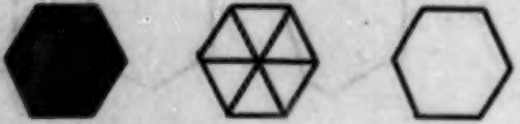

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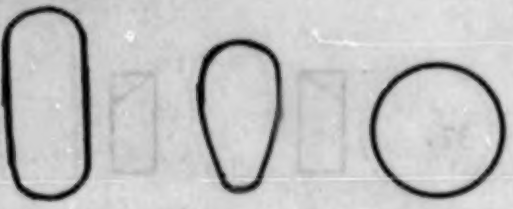

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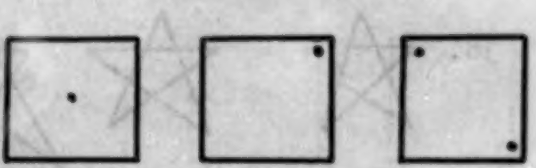

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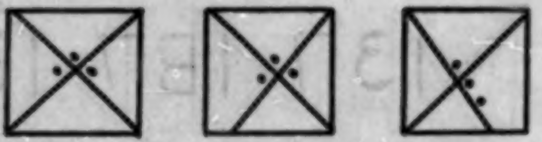

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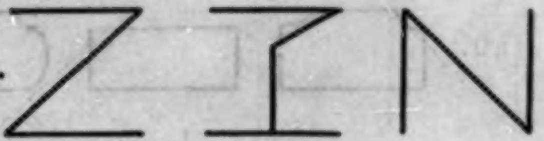

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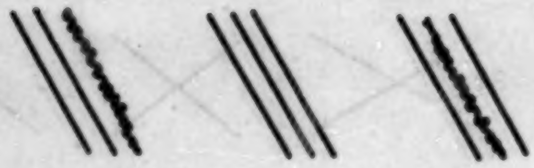

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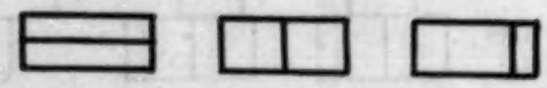

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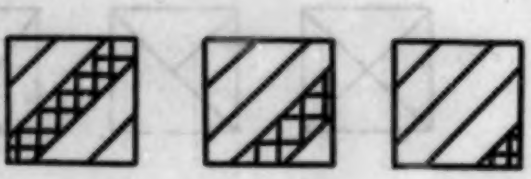

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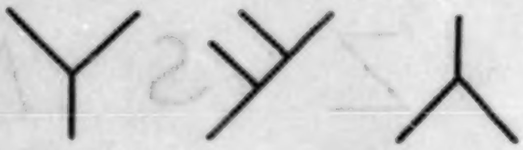

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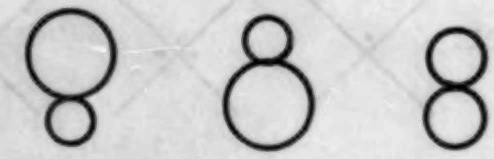

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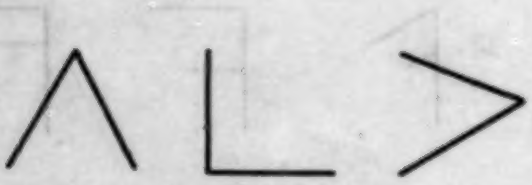

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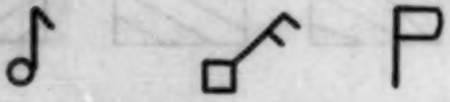

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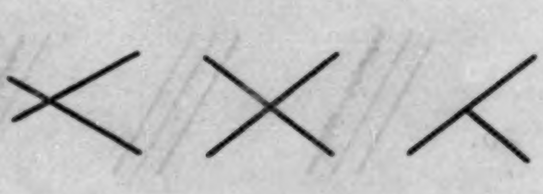

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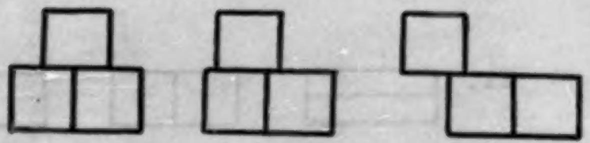

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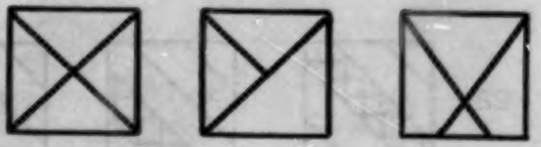

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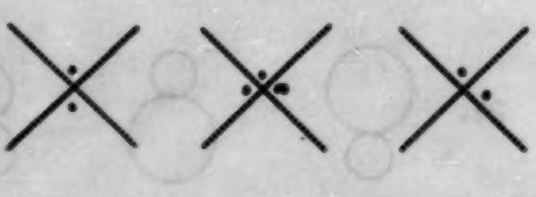

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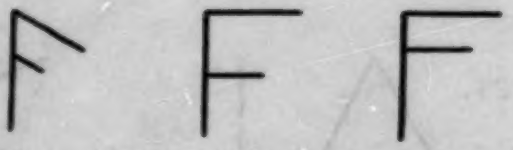

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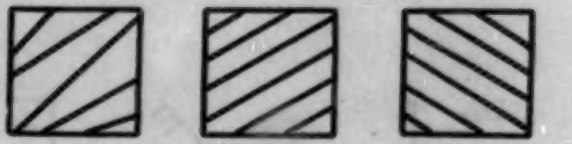

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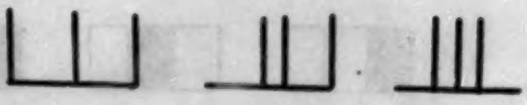

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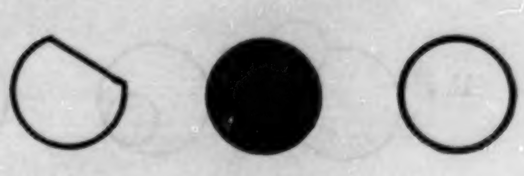

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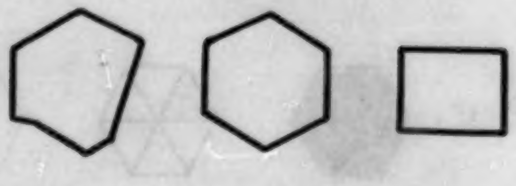

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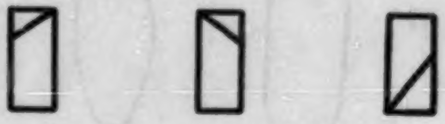

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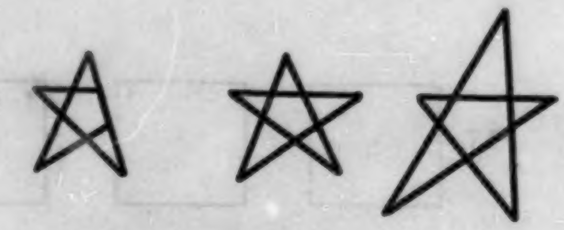

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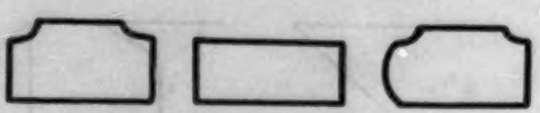

Name________________________________ School__________________ Date _____

Room________________________________ Boy________ Girl________ Age ______

THE YOU TEST

Part A

Wallace H. Maw
University of Delaware

Ethel W. Maw
Bryn Mawr College

This series of short tests is called THE YOU TEST. It is given this name because it asks you what You Think, what You Believe, what You See, what You Would Do, and what You Know. In addition, you will be asked to show how well You can solve puzzles and to write questions You want answered.

In some of the tests, the correct answer is what You think or believe. You will be told that there are no right or wrong answers for these tests.

In other tests, you will need to give or work out the correct answers. You will be told that a correct answer is required.

Part A of THE YOU TEST includes 5 different short tests. You may have taken Part B earlier or, if not, you may take it later.

You must work on one test at a time. You may not go ahead to the next test nor return to work on earlier ones. The examiner will tell you when to begin each test and when to stop. Work as quickly as you can, but try to be as accurate as you can be. Try hard to give what you think is the correct answer for each item.

PLEASE

STOP

DO NOT TURN PAGE

UNTIL TOLD TO

DO SO.

(C) Wallace H. Maw and Ethel W. Maw, 1961.

WHAT WOULD YOU DO?

Directions: In each of the questions below, mark the thing you would do or would prefer to do if you had to do one of the four. There is no wrong answer. You may prefer to do one thing and someone else may prefer to do something different.

1. If you could have any of the following for your birthday, would you select:

    ____ a phonograph

    ____ a badminton set

    ____ a checker game

    ____ a microscope?

2. If someone gave you a trick toy bird that would sit still for a few minutes and then wave its wings, would you:

    ____ try to keep it as new as you could

    ____ try to find out how it works

    ____ show it to your friends

    ____ play with it until it wears out?

3. If on your way to school you saw a strange bird, would you:

    ____ forget about it

    ____ try to identify it by guessing

    ____ try to identify it by comparing it with pictures

    ____ ask your teacher what it is?

4. If you went to the library to select a book, would you select:

    ____ True Facts About the Moon

    ____ Dale's Dream About a Trip to the Moon

    ____ The Story of the Man in the Moon

    ____ A Book of Poems About the Moon?

WHAT WOULD YOU DO? Continued

5. If you were in a room with all kinds of maps, would you look first at maps of:

____ your city

____ the routes to nearby cities

____ the U.S.A.

____ the ancient world?

6. If you were given a puppet, would you:

____ pull the strings to see the legs and arms work

____ spend enough time to learn how to make the parts work well

____ forget about it because the strings got mixed up too easily

____ ask someone to work it for you?

7. If you belonged to one club and some of your classmates belonged to another, would you:

____ pretend you did not know about the other club

____ try to find out what they did in the other club

____ keep them from finding out what you did

____ tell them that your club was the better club?

8. If you went to a dog show and one of the dogs was behind a sign marked "SAMOYEDE", would you:

____ think the name was wrong

____ write it down and look in an encyclopedia to see if there were such a dog

____ notice carefully what the dog looked like

____ forget about it?

9. If your mother bought you a new coat that the salesman said was made from coal, would you:

____ laugh at him

____ feel the coat

____ ask how the coat was made

____ think you had something special?

WHAT WOULD YOU DO? Continued

10. If you were grown up, would you want to be:

_____ a teacher

_____ a clerk in a store

_____ a farmer

_____ a detective?

11. If someone said that he had a counterfeit dollar bill, would you say:

_____ "I don't believe it."

_____ "It looks like any other dollar bill."

_____ "Let me feel it."

_____ "Let's look at it and a real one under a reading glass."

12. If you had enough money to travel, which would you like to visit first:

_____ countries in Europe where English is spoken

_____ cities in Asia

_____ the upper part of the Congo River in Africa

_____ countries in Europe where languages other than English are spoken?

13. If you were told to go to the library and pick out any book you wanted, would you pick one that:

_____ had pretty pictures in it

_____ was written by someone whose books you had read before

_____ was easy to read

_____ told about how magicians did their tricks even if it were hard to read?

14. If you were alone, would you:

_____ dream of what you want to be when you are older

_____ read a funny book

_____ take apart small things like an old alarm clock

_____ take a nap?

WHAT WOULD YOU DO? Continued

15. If you had a dollar, would you:

____ buy a big bag of candy

____ buy a toy

____ buy a book

____ buy some fruit?

16. If you had a favorite movie star, T.V. star, or baseball star, which would you rather do:

____ collect pictures of the star

____ write letters to the star

____ draw pictures of the star

____ find out all you could about his or her successes and failures?

17. If you found a strange insect, would you:

____ step on it

____ pay no attention to it

____ call others to see it

____ watch to see what it would do?

18. If you had to do one of the following, which would you select:

____ learn a poem by heart

____ find answers to questions

____ prepare a report for social studies

____ study spelling?

19. If you were out of school, would you want to:

____ keep books in a store

____ hunt for new minerals

____ work in a library

____ do landscape gardening?

WHAT WOULD YOU DO? Continued

20. If you heard a strange noise, would you:

____ try to find out what caused the noise

____ run away as fast as you could

____ make a good guess about what caused the noise

____ pay no attention to the noise?

21. If someone showed you an amazing trick, would you:

____ ask the person to show you how to do the trick

____ show the person that you can do tricks, too

____ enjoy the trick and then forget about it

____ tell you friends about the trick?

22. If you were at home and the mailman came, would you:

____ wave to him

____ rush to see what he had brought

____ leave the mail in the box

____ call to your mother or some other member of your family and say that the mail had come?

23. If you were coming to the end of an interesting story and your friends came to play, would you:

____ quickly turn to the end to see how the story came out

____ tell your friends you would join them when you finished the story

____ mark your place and join your friends

____ play with your friends and forget about the story?

24. In science class would you prefer:

____ to learn to spell the names of animals

____ to give reports on your readings

____ to find answers to questions

____ to learn definitions of words?

WHAT WOULD YOU DO? Continued

25. If you saw a pile of leaves moving up and down, would you:

____ walk away from it
____ throw rocks at it
____ think the wind was blowing the leaves
____ find out what was making it move?

26. If you had a number of coins, would you:

____ exchange them for paper bills
____ see how many coins you had
____ look at the date on each coin
____ start a Christmas fund with them?

PLEASE STOP

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UNTIL TOLD TO

DO SO.

WHICH SAYING DO YOU BELIEVE?

Directions: All of you have heard many old sayings. If you stop to think of what they mean, you find that some are opposite to others. Below are listed pairs of sayings. Please mark the one of each pair that you believe is more nearly true most of the time.

1. ____ Don't bite off more than you can chew.
   ____ Anything is possible

2. ____ Dare to follow the truth.
   ____ Don't rock the boat.

3. ____ Fortune favors the brave.
   ____ It's better to be a live coward than a dead hero.

4. ____ Ignorance is bliss.
   ____ Only the wise can see the true beauty of life.

5. ____ Don't change horses in the middle of the stream.
   ____ It's never too late to change.

6. ____ He who acts on impulse seldom wins a prize.
   ____ Seize the opportunity when it presents itself.

7. ____ Let well enough alone.
   ____ Never do things by halves.

8. ____ First study, then act.
   ____ First thoughts are brilliant.

9. ____ Be good, and let who will be clever.
   ____ Seek knowledge so you may act wisely.

WHICH SAYING DO YOU BELIEVE? Continued

10. ____ You don't know what you can do until you try.

____ Never start a thing you can't finish.

11. ____ Keep the common road and be safe.

____ The best view is from the heights.

12. ____ Second thoughts are wise.

____ The quick answer is usually the right answer.

13. ____ All things come to him who waits.

____ Who stands still in the mud sticks in it.

14. ____ Let well enough alone.

____ Nothing like trying.

15. ____ It's never too late to change.

____ You can't teach an old dog new tricks.

16. ____ A bird in the hand is worth two in the bush.

____ Coins in a locked box earn no interest.

PLEASE STOP

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Name______________________ School____________________ Date ______

Room______________________ Boy__________ Girl__________ Age________

THE YOU TEST

Part B

Wallace H. Maw
University of Delaware

Ethel W. Maw
Bryn Mawr College

This series of short tests is called THE YOU TEST. It is given this name because it asks you what You Think, what You Believe, what You See, what You Would Do, and what You Know. In addition, you will be asked to show how well You can solve puzzles and to write questions You want answered.

In some of the tests, the correct answer is what You think or believe. You will be told that there are no right or wrong answers for these tests.

In other tests, you will need to give or work out the correct answers. You will be told that a correct answer is required.

Part B of THE YOU TEST includes 5 different short tests. You may have taken Part A earlier or, if not, you may take it later.

You must work on one test at a time. You may not go ahead to the next test nor return to work on earlier ones. The examiner will tell you when to begin each test and when to stop. Work as quickly as you can, but try to be as accurate as you can be. Try hard to give what you think is the correct answer for each item.

PLEASE STOP

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UNTIL TOLD TO DO SO.

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WHICH DO YOU THINK ARE FOOLISH SAYINGS?

Directions: Some of the following statements have parts in them that make them foolish. Other statements are all right. Put an X before the foolish ones; and a C before those that are all right.

Be careful, don't laugh out loud. If you do you will spoil the fun for your friends. You may laugh at something they don't think is foolish.

____ 1. Bob said to Jack, "I'll meet you at the lodge. If I get there first, I'll make a chalk mark on the door. If you get there first, rub it out."

____ 2. The soldiers were outnumbered so they gave up without a fight.

____ 3. A man who was charged with driving at the rate of 70 miles per hour insisted that he could not be guilty since he had been out driving for only one-half hour.

____ 4. On their trip to the fire station, none of the little children wanted to be last in line. The kind teacher solved the problem by letting the last child in line come up and walk with her.

____ 5. The soldier said, "If I have to choose between spending the rest of my life in jail or in the grave, I'll choose jail."

____ 6. His uncle is twice as old as my father was when I was born.

____ 7. John wanted to be a basketball player. He practiced an hour every evening before he started his homework.

____ 8. My grandparents have no daughters and no sons.

____ 9. She picked up the melted ice cubes and dropped them into the pail.

____10. Helen said, "I have three sisters: Mary, Susan, and myself."

____11. Mrs. Jones mailed her order to the store. At the bottom of the order she wrote, "Please let me know if you do not receive this order."

____12. Father said, "Come to the table and I will show you how to play the game."

____13. The captain said, "Don't shoot until you see the whites of their eyes."

WHICH DO YOU THINK ARE FOOLISH SAYINGS? Continued

_____14. The ladder broke when my father was painting the house. Luckily he was not far from the ground when it happened, so he was not hurt.

_____15. It is a week from Christmas to New Year's but almost twelve months from New Year's to Christmas.

_____16. There have been no girls born in my family for the past three generations.

_____17. The people pushed forward to see what had happened. They made it impossible for the rescue teams to work.

_____18. The family had taken a long vacation. They told their neighbor that they had taken over 200 pictures.

_____19. He ran quickly up the stairs and hurried down the hall. He was hoping he would be late for his first class.

_____20. The sunlight pouring in through windows on all four sides of the room made such a glare that I hurried to pull the blinds.

_____21. If you can't read type of this size, you need glasses.

_____22. Why is Sam Brown so stingy with his son? He has so much money that he could give his son half of it and still be the richest man in a very wealthy family.

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UNTIL TOLD TO DO SO.

WHAT DO YOU KNOW?

Directions: All pupils learn many facts. Some of the facts are learned in school; a large number are learned from other places. How many of the following facts do you know? Mark an X in front of the correct ending for each of the following items.

1. The president of the United States who was once a surveyor was

   ____ Herbert Hoover

   ____ Franklin Roosevelt

   ____ George Washington

   ____ U. S. Grant

2. According to legend, the wooden horse of Troy contained

   ____ gifts for the goddess Athena

   ____ Greek soldiers

   ____ two large sea serpents

   ____ fire that destroyed the city of Troy.

3. Joan of Arc

   ____ was beheaded by Henry VIII of England

   ____ was burned at the stake

   ____ died in battle

   ____ was accidentally shot by a French soldier.

4. Venus is a planet that was named for a goddess. Of the planets, it is the

   ____ closest to the sun

   ____ farthest from the sun

   ____ second closest to the sun

   ____ farthest from the earth.

WHAT DO YOU KNOW? Continued

5. The wife of John Adams was a person of great ability. Her name was

_____ Abigail

_____ Audrey

_____ Alice

_____ Aletha

6. The United Nations is an organization of nations that works for peace in the world. Its meeting place is

_____ Paris, France

_____ London, England

_____ Washington, D. C.

_____ New York City

7. A boy or girl who can do addition problems quickly might be called a good adder. Adder is also the name of a

_____ dog

_____ fish

_____ snake

_____ horse

8. Whales are large animals. Some of them are more than

_____ 25 feet long

_____ 50 feet long

_____ 75 feet long

_____ 100 feet long

9. The loom is used

_____ in making cloth

_____ in grinding wheat

_____ in mining coal

_____ in baking bread

WHAT DO YOU KNOW? Continued

10. Maize is another name for

_____ rice

_____ wheat

_____ barley

_____ corn.

11. The humped cattle of India that have been brought into the United States are

_____ zebus

_____ buffalo

_____ bison

_____ Guernseys

12. Delaware is called the First State or the Diamond State; Maine is called the

_____ Lighthouse State

_____ Lobster State

_____ Harbor State

_____ Pine Tree State

13. Queen Victoria was

_____ the Spanish queen who helped Columbus

_____ queen of England in the 19th Century

_____ the first queen of France

_____ queen of the Netherlands during World War I

14. To square a number you must

_____ multiply it by two

_____ add it to two

_____ multiply it by itself

_____ divide it by two

WHAT DO YOU KNOW?   Continued

15. A pint is equal to

_____ one cup

_____ two cups

_____ two and one-half cups

_____ four cups

16. The highest mountain in the world is

_____ Mount Everest

_____ Mount Vernon

_____ Mount Blanc

_____ Mount Washington

17. A diamond is made of

_____ oxygen

_____ hydrogen

_____ nitrogen

_____ carbon

18. The diet of the vampire bat of Central and South America consists of

_____ tropical insects

_____ the nectar of flowers

_____ warm blood

_____ tropical fruits

PLEASE STOP

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UNTIL TOLD TO DO SO.

APPENDIX E

Schools and School Personnel Cooperating

in the Investigation

The following schools and school personnel participated in one or more phases of the investigation:

ALFRED I. DUPONT SCHOOL DISTRICT

Arthur T. Nelson, Supervising Principal

Faulk Road Elementary School
  Warren R. Good - Principal
    William Bailey
    Mrs. Margaret Doty
    Frank Goff
    Mrs. Ann Herndon
    Joseph Kephart
    Mrs. Beverly Townsley

Lombardy Elementary School
  Edison W. Blevins - Principal
    Mrs. Mamie Afflerbach
    Mrs. Florence Evans
    Mrs. Jean Young

MOUNT PLEASANT SPECIAL SCHOOL DISTRICT

John F. Heiney, Superintendent

Edge Moor Elementary School
  Joseph Connelly - Principal
    Mrs. Susan R. Hall
    Mrs. Gladys P. Shelvey

River Road Elementary School
  Carl A. Wilson - Principal
    Kathryn Moore
    Mrs. Janet V. Opdyke
    Marie E. Galt

NEWARK SPECIAL DISTRICT

Wilmer E. Shue, Superintendent

E. Frances Medill Elementary School
  Elwood C. Bittenbender - Principal
    Mrs. Margaret L. Koelig
    Mrs. Emily H. McGlinchey
    Mrs. Charlotte L. Wheatley

Jennie E. Smith Elementary School
Henry M. Brader - Principal
Mrs. Beatrice T. Derickson
Mrs. Madalynne M. Evans
Mrs. Marion L. Stevenson

NEW CASTLE SPECIAL SCHOOL DISTRICT

Joseph E. Kleckner, Superintendent

Carrie Downie Elementary School
Charles T. Haegele - Principal
Mrs. Hertha B. Graham
Miss Elizabeth T. Somes
Miss Sara Schoch

Wilmington Manor Elementary School
Robert L. Davis - Principal
Mrs. Blanche Champion
Miss Ellen Eisenhour
Aaron La Fon
Mrs. Doris E. Walker

STANTON SCHOOL DISTRICT

Harlan E. Highfield, Supervising Principal

Lora Little Elementary School
Robert J. Miller - Principal
Mrs. Sarah T. Peltier
E. James Smith
Mrs. Bernadine J. Waite

Stanton Elementary School
Henry R. Hoerner - Principal
H. Vincent Harris
C. Harold Morgart
Edward L. Stephens